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CONTENTS

PAGE

1. Farming Methods in Ayrshire. By Archd. MacNeilage 1
2. Timothy Meadows. By John Drysdale 17
3. Crop Yields at Home and Abroad. By William E. Bear 23
4. Changes in Farm Implements since 1890. By John Speir 46
5. Dairy Investigations in the North-East of England. By Douglas A. Gilchrist and C. Bryner Jones . 63
6. A New Nitrogenous Manure. Lime Nitrogen or Calcium Cyanamide. By James Hendrick, B.Sc., F.I.C. . . 75
7. Analyses for Members during 1905. By James Hendrick, B.Sc., F.I.C. 77
8. Top-Dressing Pastures. Slag, Kainit, and Lime. By R. Shirra Gibb 80
9. Nitrogenous Manures for Turnips. By R. Patrick Wright, F.H.A.S., F.R.S.E. 93
10. Milk Investigations at Garforth, 1905. By Charles Crowther, M.A., Ph.D. (*Illustrated*) 110
11. The Potato Crop. By David Young. (*Illustrated*) . 143
12. Famous Galloways. By Very Rev. John Gillespie, LL.D. (*Illustrated*) 166
13. Aberdeenshire Horned Cattle. By James R. Barclay. (*Illustrated*) 193
14. Trials of Suction Gas-Producer Plants. (*Illustrated*) . 208
15. On some Injurious Insects in 1905. By Dr R. Stewart MacDougall, M.A. (*Illustrated*) 224
16. Milk Records. Third Season—Giving the yield in Milk and Butter-fat of 815 Cows. By John Speir . . 237
17. The Composition of Turnips and Swedes. By James Hendrick, B.Sc., F.I.C. (*Illustrated*) 281

18. The Cereal and other Crops of Scotland for 1905, and Meteorology of the Year relative thereto—
The Crops 297
The Meteorology. By Alexander Buchan, LL.D., F.R.S. 319
19. Agricultural Statistics 329
20. Prices of Grain in Edinburgh Market for 1905 . . 342
21. Prices of Sheep since 1818 349
22. Prices of Wool since 1818 351
23. General Show at Glasgow, 1905. (*Illustrated*) . . 353
24. Trial of Swathe Turners 376
25. Premiums awarded by the Society in 1905 . . 377
26. Accounts of the Society for 1905 415
27. Proceedings at the Society's Board and General Meetings 423

APPENDIX.

Premiums offered by the Society in 1906 . . . 1
Members admitted in June 1905 and January 1906 . 85

Index 1

**** It is to be distinctly understood that the Society is not responsible for the views, statements, or opinions of any of the Writers whose Papers are published in the 'Transactions.'*

ILLUSTRATIONS

- - -

FIG. PAGE
1. Diagram showing fluctuations in yield and quality of milk during Periods I. and II. (Means for consecutive periods of three days each). 125
2. Diagram showing fluctuations in yield and quality of milk during Periods II. and III. (Means for consecutive periods of three days each). 126
3. Collecting pollen in potatoes . 151
4. Removing anthers previous to fertilising . , . . 152
5. In the act of fertilising . . 152
6. A closer view of the act of fertilising 153
7. Berries four weeks after fertilisation 153
8. Harden (1151) 172
9. Mosstrooper of Drumlanrig (1672) 171
10. Black Douglas of Castlemilk (5002), Nancy Lee 2nd of Castlemilk (14,678) . . 178
11. Excelsior (7702) . . . 182
12. Tidy 8th (4313) . . . 184
13. Dora of Durhamhill (13,550) . 186
14. Alice 2nd of Castlemilk (16,352) 188
15. Alice 3rd of Castlemilk (16,867) 188
16. Nancy Lee 3rd of Castlemilk (15,019). 190
17. Nancy Lee 3rd of Castlemilk (15,019), Lady Lee of Castlemilk (15,910) . . . 190
FIG. PAGE
18. Nancy Lee 3rd (15,019) and her daughters 191
19. Camp - Follower of Stepford (7476) 191
20. Kintore ox 201
21. The "Campbell" suction gas plant 213
22. The "Crossley" suction gas plant 213
23. The "Industrial" suction gas plant 215
24. The "Dowson" suction gas-producer 215
25. The "Tangye" suction gas-producer 217
26. Insects injurious to agriculture (Nos. 1-12) 229
27. Forest insect enemies (Nos. 1-23) 230
28. Green-top yellow turnips. . 285
29. Method of sampling turnips . 286
30. Shorthorn Bull, "Roan Conqueror" (84,519) . . . 359
31. Aberdeen-Angus Bull, "Jim of Delvin" (20,691) . . . 359
32. Galloway Cow, "Knockstocks Jessie" (16,116) . . . 360
33. Highland Heifer, "Laochag" . 360
34. Ayrshire Cow, "Harvey 6th of Mauswrae" (14,239) . . 361
35. Clydesdale Stallion, "Royal Chattan" (11,489). . . 361
36. Draught Gelding, "King Harry" 362
37. Clydesdale Filly, "Rosadora". 362
38. Draught Gelding, "Regent" . 363

FIG. PAGE
39. Hunter Gelding, "Baronet" . 363
40. Hackney Mare, "Crayke Czarina" (15,715) 364
41. Pony Stallion, "Horace Junior" 364
42. Arab Pony Stallion, "Mahmud" (296) 365
43. Pony Gelding, "Boland" . 365
44. Highland Pony, "Bonnie Laddie" (329) 366
45. Shetland Pony Stallion, "Marquis" 366

FIG. PAGE
46. "Princess," Mare in harness . 367
47. Van Horse, "Climax" . . 368
48. Blackface Shearling Tup . . 369
49. Cheviot Tup 369
50. Border Leicester Shearling Tup 370
51. Half-bred Shearling Tup . . 370
52. Shropshire Tup . . . 371
53. Oxford Down Shearling Tup . 371
54. Suffolk Shearling Ewe . . 372
55. Large White Boar, "Broomhouse Laddie" (7279) . . 372

TRANSACTIONS

OF

THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND

FARMING METHODS IN AYRSHIRE.

By ARCHD. MACNEILAGE, Editor of 'The Scottish Farmer.'

THE original plan of this paper included a review of farming methods in the Glasgow Show district, but later developments rendered it expedient to confine the account for this volume to Ayrshire. Probably space will be found for the remainder of the material, which has been so kindly placed at my disposal, in a succeeding volume of the 'Transactions.'

The county of Ayr exhibits a very wide variety of agricultural methods, and in this respect it probably leads among the counties of Scotland.

In the southern parts of Ayrshire we find sheep-farming and the rearing of cross-bred calves prosecuted with intelligence and vigour. Not many miles farther north we enter the paradise of the early potato grower—and no two methods of farming could be more unlike than, say, that prosecuted by Mr Thomas Carswell on Chirmorrie, Barrhill, and that which Mr John M. Hannah has rendered almost world-famous on Girvan Mains. Coming northward to the great stretch of arable land between Ayr and Irvine, agricultural practice of an advanced type finds illustration not excelled in the superb agriculture of the Dunbar district. Still travelling northward, in the section of the county formerly known as Cunningham, on high-lying cold clay land, the practice of successful farming without roots has been carried out; and on the higher reaches, to the east along the Lanarkshire border, the breeding and rearing of Blackfaced sheep is prosecuted with a zeal and a success unequalled in any other part of Scotland.

Considerable difficulty, in these circumstances, presents itself in making choice of subjects, not because the field of selection is narrow, but because it is so wide. I propose to summarise what may be said regarding farms in North Ayrshire, where the practice of farming without roots prevails, and thereafter to take typical farms in other parts of the district and describe the methods pursued thereon with some fulness of detail. The hearty response to my invitations for help has left me embarrassed with a plethora of material, which possibly I may have opportunity of utilising on a future occasion. Will those who have returned answers to my schedules of inquiry accept this general acknowledgment, and, in particular, the many correspondents whose names space-limits render it impossible for me to mention?

NORTH AYRSHIRE.

The prevailing soil in this locality is a cold hard clay, difficult to work under any circumstances, and impossible to work profitably under the old *régime* of a six-course shift, with the green crop the backbone of the rotation. The dominating stock is the Ayrshire, and the leading industry dairying, either in its primary form of milk-selling or its secondary of cheesemaking. Farms in this locality vary from about 100 acres to anywhere close up to 300 acres—although the majority will be under rather than over 200 acres. The most of this land was at one time drained, but now it requires to be re-drained, as the work done was not efficient; and where there are mineral workings the surface has fallen, and such drains as there are, are in an unsatisfactory state. The consequence is that even where the answer to the question, Is the land well drained? might theoretically be in the affirmative, practically it is in the negative.

With respect to housing it is different. Byres are, of course, the chief necessity on dairy farms, and their condition to a large extent depends on the resources of the landlord. In some cases in Ayrshire they could hardly be improved; in others the question arises, What are the officials of the Local Authority doing? The condition of some of the byres in Kyle urgently calls for attention on the part of the county authorities. There are areas in Ayrshire into which difficulties concerning air space, floor space, and glass space have not entered. But on the whole, in North Ayrshire proper there are good byres. More light would in some cases be an improvement, and sometimes the tenant secures adequate ventilation by the exercise of a large amount of inventiveness.

Cheapening the Cost of Steadings.

Mr Wallace, Auchenbrain, thinks the building of factories where milk would be handled in large quantities at less cost, would be much cheaper than the present system of equipping each farm with full dairy buildings. Mr James Dunlop, Midland, Fenwick, argues in favour of cheaper buildings, which might be more easily adapted to the changing circumstances of agriculture. This view is taken by many correspondents, who think cement walls and corrugated iron roofs quite suitable for the housing of cattle.

A Rotation without Roots.

The rotation of crops generally followed on these upland farms is a seven years' course—viz., two white crops (oats) in succession, then two crops of hay in succession, followed by three years in pasture. The first hay crop is ryegrass, which is seeded and thrashed. This used to be a great feature in Ayrshire, and it still holds the field. The hay is allowed to ripen; then it is cut with the reaper, bound in sheaves, stooked, and ricked or "hutted." After being thrashed out of the "huts," the seed is cleaned and sold to the merchants. In old days much of it was exported, and the production of hay seed was a profitable department of Ayrshire farming. It is still in a measure profitable, but complaint is made that while merchants sell to the farmer by the boll (96 lb.), they insist on buying by the cwt. (112 lb.), and the difference between the two prices is not relative to the difference between the two weights. The merchants have also formed a strong combination, with the result that the Ayrshire seed trade is not as profitable as it used to be. Ireland is producing better seed than formerly, and this also tends to beat down the prices. Timothy is sown along with the ryegrass, and in the second year it is cut green and fed to stock. Thereafter the land is pastured for three seasons.

It is believed that better pasture is secured in this way than by green-cropping, which is a peculiarly costly enterprise on cold, wet, clay soil. The land is liberally manured on the stubble, and it is generally admitted that only by adopting this general system could such cold clay land be kept in cultivation. Some who have never seen its results in Ayrshire condemn the system as opposed to the rules of good husbandry;

but all the answer that can be given to such an objection is, "Come and see!" Foulness and weeds disappear from this land after being liberally manured and allowed to lie in pasture as indicated. The reduction in the labour bill is marked, and the fertility of the soil is manifest.

Mr Adam W. Montgomerie, who farms 270 acres of this cold clay soil at Lessnessock, in Ochiltree parish, says the system is well suited for wet clay land. His rotation is oats (Tam Finlay, Early Fellow, Longhoughton, and Tartar King on mossy land), oats, hay, and then pasture for seven or eight years. He finds that a timothy meadow laid down in the manner described lasts about eight years. He applies farmyard manure to the meadow every second year, plus 2 cwt. per acre of a mixture made up of 3 cwt. superphosphate, 1 cwt. potash, and 1 cwt. nitrate of soda. In the alternate year the application is 4 cwt. per acre of the same mixture. The great lesson taught by this method of farming is that in no way can dung be so efficiently applied as to pasture. Besides this application of the above-named artificials to the pasture, Mr Montgomerie applies to the oat crop 4 cwt. per acre of the following mixture: 3 cwt. superphosphate, 1 cwt. sulphate of potash, and 1 cwt. sulphate of ammonia. Basic slag for rough pasture, and potassic manures for improving the growth of clovers, are commended.

Change of Seed.

Mr James Howie, Hillhouse, Kilmarnock, follows very much the same course. Most of these Ayrshire men believe in getting a change of oat seed from Mid-Lothian, and as a rule they favour Longhoughton and Tam Finlay varieties, the latter very much for the sake of its straw.

Lea ploughing begins about the New Year, and stubble ploughing about the middle of February, or whenever the land is in a fine dry condition—an essential element in the success of this kind of farming. Autumn manuring is approved, or, as Mr Howie puts it, "I approve of farmyard manure being applied whenever land is in condition for carting it on." He gives his lea oats a dressing of 3 cwt. superphosphate and ¾ cwt. muriate of potash; stubble oats, 5 cwt. dissolved bones; and timothy hay, 1 cwt. nitrate of soda—all per acre. He believes a timothy meadow on a good clay will last as long as you are good to it. He applies a heavy dressing of dung to the timothy early in winter and spring, and a dressing of nitrate of soda in the end of April. That this is good farming is proved by the fact that in 1905 Hillhouse was carrying four times the number of stock which it carried in 1892.

Mr Wallace, Auchenbrain, Mauchline, follows very much the same course, except that, when he has land suitable, he lays out about 3 acres in green crop. The turnip yield varies greatly. In 1905 he had from about 30 to 40 tons per acre, while in 1903 the return would not be more than 15 tons per acre. He sows about 5 bushels short oats per acre when handling well-tried varieties, but when experimenting with new sorts he goes as far as 8 bushels to the acre. He top-dresses with farmyard manure in autumn, and is a great believer in pure dissolved bones, which he applies at the rate of 5 cwt. per acre. He applies the farmyard manure and the 5 cwt. dissolved bones plus 1 cwt. sulphate of ammonia to the timothy meadow in alternate years. Change of oat seed is obtained from the Lothians in alternate years, and in this way a healthy growth is secured. Hay harvest in these high-lying cold districts begins usually about the first week in July, and oat harvest in the second week in September.

A Fenwick Laird.

Mr James Dunlop of Gree, Fenwick, farms his own land (92 acres), and has laid it all out in this way, without green-cropping. He applies lime and dissolved bones to the oat crop, but does not care much for the autumn application of farmyard manure, preferring to put it on in March or April. He applies a mixture of 1 cwt. superphosphate plus ½ cwt. nitrate of soda per acre to pasture, and eulogises basic slag as applied to rough pasture. He grows a timothy meadow of 18 acres wholly by irrigation, and puts the life of such at about fifteen years.

AN ARABLE CLAY FARM.

Mr William Howie, who has succeeded his father on the famous Ayrshire farm of Burnhouses, Kilmarnock, farms 230 acres of arable wet clay land. He finds the system of cropping without roots by far the best for him, and in the main follows the rotation and treatment already described. The timothy meadow gets dung the one year, and 4 cwt. superphosphate, 1 cwt. sulphate of ammonia, or nitrate of soda, the next. He does not think the market for hay seed is at all as good as it used to be, and, like other farmers on the wet clay, grows Longhoughton and Tam Finlay oats.

A Farmer who requires Roots.

Mr James Dunlop, Midland, Fenwick, farms a clay loam, with about 50 acres out of a total 160 acres, peaty. Some draining has been done on this farm recently. The drains have been put in 16½ ft. apart, 2½ ft. deep, with tiles, at a total cost of about £9 to £10 per acre. Mr Dunlop limits his autumn application of farmyard manure to the timothy meadow and grass. He applies to the hay from 6 to 10 tons per acre of farmyard manure, 2 cwt. superphosphate or 4 cwt. basic slag, 1 cwt. muriate of potash, and 1 to 1½ cwt. sulphate of ammonia. He approves of basic slag for rough pasture, and potassic manures with him improve the quality of both grain and straw, and encourage the growth of clovers. Mr Dunlop does a little more in green-cropping than some of his neighbours. He plants Epicures and British Queens among potatoes, in 28-in. drills, set 6 in. apart with cut sets. He boxes his seed late, and cuts big-sized potatoes for seed.

As is well known, Mr Dunlop, like Mr Wallace, Auchenbrain, makes a speciality of Border Leicester sheep, in the breeding of which both gentlemen have achieved quite a superior reputation. Their high-lying clay soils seem to be well adapted for rearing a hardy class of sheep, and good averages stand to their credit at the Kelso Ram Sales in September.

Dairying the Backbone.

The backbone of all this agriculture is dairying, and it is of material interest to understand a little about the development of this branch. Mr Andrew Sloan, who resides with his father, Mr Alexander Sloan, on the farm of Greenhill, two miles due west from Kilmarnock, has devoted special attention to this interest in recent years. Collating the information supplied by him and the others already named, it would appear that the market for whole milk is either Kilmarnock, and other centres of population in the county, or Glasgow by rail. The price realised by one who sends to Kilmarnock is 86 for the twelve months, or as we understand it, taking an average of the twelve months, fully 7d. per imperial gallon. Another who sends to Glasgow quotes his average price for the twelve months at 7¼d. to 7¾d. per imperial gallon, from which must be deducted the cost of transit, which is put at a fraction between ¼d. and 1d. per gallon. The actual prices realised for winter milk railed to Glasgow, from a farm on which Cheddar cheese of a superior brand is made in summer, are: October, 7½d.; November, 8½d.; December, January, and February, 9d.; and March, 7½d. per gallon. The cost of producing a gallon of milk is put at 5½d., so that the North Ayrshire farmers work on a very narrow margin of profit indeed, when the nature of the work is considered.

Dairying entails a seven days' week, and the scene at Kilmarnock on a Sabbath morning when the milk is being shipped awakens considerable misgivings on the part of the onlooker.

He can imagine the excess of labour undergone by all hands on the farm before the milk has been brought so far, then the labour in shipping and the labour in distribution. As milk is usually bought on quality, and the price is fixed on a total for the twelve months, sometimes it goes as low as 5½d. per gallon, which barely pays production; and at other seasons, if carefully graded, the farmer may net 9½d.

The Bowing System.

In the case of farms supplying milk direct to a town like Kilmarnock, sometimes the cows are let to a "bower," a functionary unknown in some parts of rural Scotland. He rents the cows at from £12 to £15 per head per annum. The farmer supplies him with all hay and straw for the animals, 5 cwt. bean-meal (genuine), and 2 cwt. bran per annum for each cow. He also allows the bower £8 to £10 per head for cake in lieu of roots, and has to replace any cow whose milk does not come up to a good average standard in respect of yield and quality.

This brief outline will have served to prepare for the statement that the relations between farmer and bower are of a delicate nature, and easily lend themselves to the production of friction. Hence the "letting" of dairies in this fashion is less in favour than it used to be.

Labour and Costs.

The cost of labour on farms managed on the North Ayrshire system is a point of considerable importance. Its recommendation is that labour is less than on a green-cropping farm, while the land, being covered with a thorough seeding of sound grasses, is after the second year thoroughly cleaned. On a farm of 140 acres the employees are: one ploughman, one odd man ("orra" man in the north), who assists in the byre and delivers the milk, one harvester (in season), four women workers —*i.e.*, two girls, one for house, and the other for dairy and byre, and these, along with other two milkers, constitute the female staff. The ploughman receives 21s. per week, with house and his coals carted free. The "odd" man gets 1s. per week less. The harvester gets 25s. per week. The girls are "feed" at £11 each per half-year, staying in the house; and the milkers get 3s. 6d. each per week. The estimated cost of the oat crop per acre from the beginning of ploughing until the crop is marketed is put at 50s., and the cost of the hay crop is 26s.

Implements.

Farmers in North Ayrshire are not slow to avail themselves of all the newest and latest improvements in implements. The inventory for a farm such as has been described is as follows: one lea plough, one stubble high-cutting plough, iron harrows, iron roller (Jack & Sons), manual reaping machine, hay tedder (Barford & Perkins), horse rake, self-delivery (Nicholson's, Newark), hand-power rick lifter (Jack's), crane horse-fork (made by Wilson, Plain, and brought out by Mr Alexander Sloan), a useful addition to the catalogue of farm implements; coup-carts with broad wheels; and long carts of a light pattern for harvest work, but minus the cumbrous harvest rails.

CROSSBURN.

This fine holding has long enjoyed the reputation of being one of the best in the West. It is on the property of his Grace the Duke of Portland, and the present tenant is Mr David Stevenson, the well-known auctioneer and valuator. The farm is situated near to Troon and lies well, with a south-western exposure.

Soil and Drainage.

It extends to 400 acres, all arable, and the soil is partly of a good light red character and partly heavy, tending towards the Ayrshire clay. 115 acres have been drained during the past nine years. The drains have been put in 16 feet apart, 2 feet 9 inches deep, with pipe tiles, at a cost of £9 per acre.

Building and Equipment.

The steading is in good order; and the fences, which are partly of thorn hedges, with wire in other sections, are in good order. As on other farms in Ayrshire, considerable additions have recently been made to the equipment, especially in the erection of grain-sheds. Here one has been put up which cost £300, the outlay being met jointly by the landlord and tenant. Gates and fences have recently been renewed by the landlord. The farm is well situated in respect of proximity to main roads, and a railway station on the main line. It is therefore handy for markets, and is well supplied with water. A large proportion of the barn machinery is driven by a powerful water-wheel.

Rotation of Crops.

It need hardly be said that the rotation of crops and general management on Crossburn is very different from that followed on the dairy farms in North Ayrshire. The tenant is under no obligation as to rotation. He keeps part in permanent pasture; another section is worked on a four-course shift; and still a third portion, like the farms on the Girvan coast, is green-cropped every year. In seeding or planting Mr Stevenson sows 6 bushels oats per acre if sown by hand, or 4½ bushels if sown with corn-drill. He sows Waverley, Tartar King, Early Fellow, Longhoughton, Tam Finlay, and Black Oats, according to the character of the soil—90 to 100 acres in all—every year. He grows no barley, but may have a small portion of the land under wheat, which he "seeds" with 3½ bushels per acre procured from England.

Preparation of Soil.

In preparing land for green crop, Mr Stevenson ploughs only the light (potato) soil. In the case of turnip land, when it is stiff, he grubs and "cultivates" before ploughing. All land is ploughed—the stubble being dealt with, say, in October, or immediately on the back of harvest. He harrows and rolls in the usual way, and all drilling is done with Wallace's double-drill and manure sower—an extremely popular implement in Ayrshire.

Potatoes are grown to the extent of 60 acres per annum for the medium early market—that is, after the Girvan crop is off. Epicures and British Queens are the varieties usually planted, in drills 26 inches wide, with "sets" 12 inches apart, all sprouted round whole seed, boxed during autumn and winter, whenever supplies suitable for seed are available. I hardly need to describe the boxing or sprouting system, which has long since passed the experimental stage, and has been adopted in the growth of the autumn sale as well as the early potatoes. After the potatoes have been planted, the drills are harrowed down, grubbed between, and weeded; then grubbed again, and set up with the "double-wreasted" plough. Potato-digging on Crossburn usually begins about the end of July or beginning of August. The crop is sold by the acre, when growing, to the merchants, and they undertake all responsibility for the lifting. The farmer does the carting to the station.

Mr Stevenson believes in regularly "changing" his seed potatoes, which he procures off good, sound, red soil and moss. He applies to the potato land 20 tons farmyard manure per acre in autumn, and 12 cwt. 10 per cent potato manure per acre at seed-time. This potato manure is made up as follows: for earlies, 12 cwt. as above described; and for seed, 4 cwt. 10 per cent manure, plus 4 cwt. dissolved bones, mixed.

Cabbages are grown and planted at the rate of 8000 plants to the acre. Turnips—Tait's Best of All Swede, Austin's Clydesdale Swede—are sown to the extent of 4 lb. seed per acre. The land is wrought very much as for potatoes—the artificial manures applied being 4 cwt. 10 per cent special, plus 4 cwt. dissolved bones. Cabbages get the same treatment. They are planted 24 inches apart, and all put in with the spade—a laborious task.

In summing up the account of his management of green crop, Mr Stevenson says the great secret of success is never to plant or sow until the land has been perfectly wrought and is in proper "tid" to receive the seed. Always be liberal with manure.

Treatment of Clay Land.

A small part of stiff clay land on the farm is wrought, as in North Ayrshire, with two oat crops followed by hay, and this Mr Stevenson regards as a very good system for stiff land; but wherever land can be profitably green-cropped, it should always be so treated. He has a timothy meadow of about 30 acres extent, which has been cut for twenty-five years. He manures the meadow liberally with good well-made farmyard dung or moss-litter annually, if possible, to be followed by a dressing of nitrate of soda in spring. Hay harvest on Crossburn usually begins about the middle of July, and oat harvest about the end of August.

Stock on Crossburn.

Crossburn carries a big variety of stock. There is a dairy stock of 40, chiefly Ayrshires and Shorthorn - Ayrshire crosses, which are let on the "bowing" system described above. The "bower" disposes of the milk retail in Troon, where there is a good population at all times, and a very large summer population during the season. Besides these dairy cattle there is a feeding stock numbering about 70 head—which includes young stock, the produce of the cross-bred dairy cows—and an Aberdeen-Angus bull. The calves are reared by hand on new milk for the first month, afterwards on skimmed milk and oilcake, with bruised oats. There is a small flock of pure-bred Border Leicester sheep; and a flying stock of about 12 score Blackfaced ewes are put on every year. These are crossed with a Border Leicester ram to bring grey-face lambs for the early lamb market, and after they have brought one lamb the ewes are fed off for the fat market. Lambing generally commences in March. The lambs are weaned and marked in

August, and the cross hoggs and lambs are fed off on rape, grown after the potatoes are taken off, with some hand-feeding.

Horses are also bred and reared; and while Clydesdales are not neglected, Hunters are made a speciality. Usually Mr Stevenson has about half a dozen foals on the farm every season, which follow their dams until about four months old, after which they are fed on bruised oats, bran mashes, &c., and eventually broken and "made." In this department considerable success has been achieved.

Labour.

The labour employed on Crossburn includes 4 ploughmen, who each get 20s. per week with a free house; one shepherd, with similar wages; 4 ordinary labourers, at the same rate of pay; 8 women workers, each at 1s. 8d. per day; and 2 boys at the same rate. The estimated cost per acre of working green crop on this well-appointed homestead is £5; white crop, £3; and hay crop, £2.

Implements and Utensils.

The equipment of such a homestead may be worth detailing, especially as Mr Stevenson has been good enough to furnish an inventory. Here it is: Binders, reaping machine, hay rake, rollers, ploughs, grubbers, manure sowers, zigzag and saddle harrows, cultivators, drill harrows, drill ploughs, weeders, corn-drills, ryegrass sowing-machines, potato diggers, Cambridge rollers, rick-lifters, hay-slips, Dixon harrows, grass-seed harrows, "turn wreast" ploughs, &c., &c. Barn machinery—54-inch high-speed thrashing and dressing machine, with double-band trusser attached. Grinding-mill, fitted with 30-inch French Burr stones; chaff-cutter, oilcake mill, circular saw, root-pulpers, oat-bruisers, hoist for bags, &c., &c., all driven by water power. Besides the machinery and articles specified, there is the usual stocking of carts and utensils.

The above account was written on the eve of the death of Mr Stevenson, who passed away very suddenly on Tuesday, 2nd January 1906.

GIRVAN MAINS.

This noted holding, one of the best-known centres of the early potato trade in Ayrshire, is situated a short distance from the town of Girvan, along the coast laved by the warm waters of the Gulf Stream. The landlord is Mr John C. Kennedy of Dunure, and the tenant Mr John M. Hannah, who succeeded his father in the holding. It extends to 302 acres, of which all but 2 acres is sound arable land, ranging in character from the "blowing sands" of the Ayrshire dunes to medium clay.

Unique Features.

Mr Hannah rightly says that the most striking feature of the farm is its situation, and a similar remark might be made regarding all the farms on the Ayrshire coast on which early potatoes are grown. Were it not for their adaptability to that particular crop, the soil on some of these farms would be comparatively worthless. The soil, apart from the extraordinary loads of manure poured into it annually, is best characterised as "silly." In the hands of men like Mr Hannah it has become capable of yielding a high rent. Generally this land is well drained. The last draining on Girvan Mains was carried out in 1884. The drains are set 15 feet apart and 30 inches deep. They are set with tiles, and the cost of drainage would be about £7, 10s. per acre. Buildings are, as a rule, adequate; but cottage accommodation for workers might be increased and improved.

Absence of Rotation.

No rotation is followed on Girvan Mains, potatoes being generally grown year after year on the same land. When oats are sown it is with seed procured from North Ayrshire, the character of the farming in which, as we have seen, is as different from that pursued on Girvan Mains as can be. Only about one-thirtieth part of the farm will on an average be under white crop, Waverley and Wide-Awake varieties of oats being sown at the rate of 3½ bushels per acre.

Preparing Potato Land.

The treatment of this early potato land is unique. After the potatoes, which usually cover about five-sixths of the whole area, are taken off in June and July, a second crop of either rape or cabbage is put in, the preparation of the land for this crop going on immediately in rear of the potato-lifters. The land in winter is ploughed with an 8-inch deep furrow. If the land is free and loose in the early spring, a single tine of the harrows prepares it for drilling across the ploughing; if it be stiffer, it is wrought with cultivator and harrowed.

Manuring.

The dung obtained, in addition to the farmyard, from Glasgow *ex* the Transatlantic cattle-ships, is spread on the land in autumn to the extent of 20 to 22 tons per acre annually. No alternative to autumn manuring is possible in this kind of farming. Then in spring a dressing at the rate of 11 cwt. per acre of the following mixture is applied—viz., 6 cwt. sulphate of ammonia, 2 cwt. sulphate of potash, 6 cwt. superphosphate, and 1 cwt. Liebig guano.

Planting.

The very earliest varieties of potatoes, Puritans, Epicures, and Ninetyfolds, are planted in drills 25 inches by 12 inches. Whole sets of medium size, boxed in July and sprouted in dark houses until planting-time, are used. Spring work properly so-called is in full swing in February, and the drills are cultivated, cleaned, and earthed up in the usual way. Merchants buy these potatoes in some cases at public auction, in others by private bargain, and digging in an average year is in progress by the 20th June. Girvan Mains is perhaps not quite the very earliest of these Ayrshire coast farms; this honour belongs on an average of years to Straid, and sometimes Turnberry has come in very early.

Stock.

The whole cattle stock on Girvan Mains consists of 4 milk cows, Shorthorn-Ayrshire and Jersey crosses; but sheep-feeding is an essential adjunct to the business of the early potato grower. Cross shearlings are bought by Mr Hannah in August and September, and fed off on Italian ryegrass, sown after the potatoes are lifted. These cross hoggs are all disposed of before or at latest by the date of the Christmas markets. Mr Hannah is well known as an expert breeder of Clydesdales, some of the best-known show animals of recent years having been bred by him. He aims at having four foals every season, and these are reared on chop and young grass, being kept running out all the time until either sold as stallions or broken for work.

Labour and Costs.

The labour bill on an early potato farm is heavy. Mr Hannah employs 8 ploughmen at 20s. per week in money, with free house; 1 shepherd at the same money; and 2 ordinary labourers at 18s. per week. As for female labour, from 6 to 30 women are employed, according to season, weeding, &c. They are paid a uniform wage of 2d. per hour. From 4 to 10 boys will be employed at from 10s. to 14s. per week, according to ability. All hands are paid weekly. The cost of cultivating and marketing early potatoes is estimated at £3 per acre. The merchants buy the crop by the acre, and undertake the whole cost of lifting, except carting to the station, which is undertaken by the farmer.

Implements and Machinery.

In the implement equipment of a farm like Girvan Mains, Oliver chilled ploughs and the Wallace combined drill plough and manure sower can always be looked for, along with zigzag harrows, Cambridge rollers, cultivators, &c.

SHEEP-FARMING.

South Ayrshire, after Girvan is left, is a rough desolate region, the home of Blackfaces and commercial cattle of the Galloway or blue-grey (Shorthorn-Galloway) type.

Chirmorrie.

A well-known farmer in the district is Mr Thomas Carswell of Chirmorrie, Barrhill, on the estate of Mr William Weir of Adamton. The area of the farm consists of somewhere about 400 acres arable and 2200 acres rough moorland. It is chiefly mossland, with a proportion resting on a clay subsoil, growing good grass and what is known as "spruit." The fences and houses on this farm are in splendid order, an entirely new and model farm-steading having recently been erected wholly at the landlord's cost. Some of the fences are of stone with wire fence on top, and pointed with Arden lime. Others are of strand wire carried by creosoted posts. Basic slag has been found exceedingly useful on this class of land.

Live Stock.

A small herd of pedigree Galloway cattle is kept (half a dozen breeding cows). Their calves are reared on the dams, and kept until they are eighteen months old. Bulls are sold for breeding, and heifers are sold so far as not required to keep up the stock. Other calves are bought, chiefly the produce of a Cumberland white Shorthorn bull and Galloway cows; or the cows may be bought in calf, and the calves reared from the beginning on Chirmorrie. This class grows to a good size on the land in question, with good serviceable teats, and they pay well.

Mr Carswell is a well-known judge of Blackfaced sheep, which forms the staple stock on his farm. The system pursued is that of breeding rams and ewes for sale, as well as ewes to keep up the stock. About half a score of the best ram lambs are house-wintered, and what is not required for home use are sold in the succeeding autumn. Rams from other flocks are bought as lambs, and acclimatised on the farm. South Ayrshire land is not the kind on which to make experiments with highly-fed shearling rams.

Part of the ewe lambs or hoggets are wintered at home, and part are wintered away. The system pursued with the wedder lambs is that usually followed in Scotland. The lambs are sold at the autumn sales, chiefly in Ayr, and the whole is managed at a minimum cost in labour, one shepherd being the constant strength of the establishment, with such additional help as may be required from time to time according to the exigencies of the season.

LAGG.

This notable holding is on the shore a few miles south of Ayr, on the property of the Marquis of Ailsa, Culzean Castle, and is tenanted by a very energetic go-ahead gentleman, Mr Robert Lees, who has won high renown as a breeder of Blackfaced tups. I include it here as a notable example of a combination peculiar to Ayrshire—tup-breeding and extensive arable farming.

Lagg extends to 485 imperial acres, of which 300 are arable or pasture and 185 are rough pasture or moorland. The soil is light, resting on the whin rock, and although no drainage has been done recently, the land generally in the neighbourhood is well drained. Buildings and fences are fairly good, the latter being mostly stone walls with wire on top, and thorn hedges. The specialities on the farm are the breeding and rearing of Blackfaced tups, growing black oats for seed, and ryegrass for the same purpose.

Rotation and Crops.

The rotation is the four-shift course so common in the west —oats, green crop, oats, and hay.

Mr Lees sows per acre 5 bushels oats, 4 bushels barley, 3 bushels wheat, 4 lb. turnip seed, and plants 10,000 cabbages. He changes seed by purchase in England and in the Lothians. He grows Black Tartarian and Early Fellow oats to the extent of 70 acres, and grows hay for seed after the fashion prevailing in North Ayrshire. The seed is thrashed by the steam thrashing mill out of the "ricks" or "huts" in the fields. Hay harvest may begin as early as 10th July, and oat harvest by the last week in August.

Preparing the Soil and Manuring.

The stubble land is ploughed in autumn when the farmyard manure is applied. All land is ploughed, harrowed, and rolled in the usual way. Oats get a dressing of 1 cwt. sulphate of ammonia and 2 cwt. superphosphate; and potatoes, which are grown to the extent of 30 acres every year for the medium and autumn markets, get 4 cwt. sulphate of ammonia, 2 cwt. potash, and 6 cwt. superphosphates per acre. The potash manure improves the quality of the potatoes. The varieties planted are generally Epicures and British Queens. They are planted in drills 26 inches wide, with sets of round whole seed, planted 12 inches apart. The early crop is sold in July and August to the Glasgow market, and the late autumn crop is marketed in Ayr.

Swedes and other roots of the turnip variety are of course a necessity where so many tups are reared. Mr Lees claims to have had a crop up to 40 tons per acre. The land is prepared in the usual way: ploughed in autumn, harrowed in spring, grubbed, harrowed, and drilled for the reception of the seed. The roots are pulled, topped, and tailed in November and December, and stored uncovered in small "bings" or heaps in the fields. Frosts are, of course, short-time visitors on the Ayrshire coast.

Cabbages are planted in March if possible, and dressed with nitrate of soda as soon as they begin to grow.

Stock.

The farm carries a dairy stock of from 40 to 50 Ayrshire cows. Butter is made in summer, and milk sold in winter. The average price for the year is about 7d. per imperial gallon. Butter makes from 1s. to 1s. 2d. per lb., according to the season and the state of the market, which the Dane rules.

Tup-Breeding.

Blackfaced ewes of a superior class for the production of tups, which are sold chiefly at Lanark, Perth, and Ayr sales in autumn, are a leading asset on Lagg, and it may be said that the whole economy of the farm is subordinated to the successful management of this department. The lambs are taught to eat oats at weaning-time. They are housed in November and clipped in January. All through until the sales in autumn they are fed, as Mr Lees puts it, on everything that will make them grow and keep them healthy. He summarises the feeding in the terms oats, bran, barley, and steam hay chaff. I suspect they also consume a good many cabbages. This tup-rearing is, however, a trade by itself; but it is so general in South Ayrshire in combination with farming of another class, that no reference to Ayrshire would be complete without some such account as has now been given. The real sheep-farming of Ayrshire is prosecuted on the higher reaches where the waters of Irvine, Doon, Ayr, and Stinchar have their rise, in a region classically rich in memories of the heroic days in Scottish story. A full account of the rural economy of these uplands belongs properly to the industry of sheep-breeding, and would require separate treatment.

Labour.

The hired working-staff on Lagg consists of 2 ploughmen, 1 shepherd, 1 ordinary labourer, 3 women workers, and 1 boy. The wages paid for the males are as already indicated; women are paid about 10s. per week.

CONCLUSION.

In closing this partial account of Ayrshire agriculture, regret must be expressed at the absence of reference to a group of farms in the parishes of St Quivox, Monkton, and Prestwick, on which agricultural methods of the most advanced and up-to-date character are pursued. On these holdings nothing is left untried which is likely to contribute to prosperity, but unfortunately I have not been able to obtain such detailed and authentic information as would enable me to fulfil the purpose aimed at in this paper.

TIMOTHY MEADOWS.

By JOHN DRYSDALE, Port of Menteith.

THESE are times when it behoves the arable farmer to look to his ways, to so adapt his system to modern conditions that he may economise his labour bill, and as far as practicable aim at securing a maximum yield of produce at a minimum of expense. The prescribed rotation of cropping that may have been found suitable and desirable fifty or a hundred years ago is no longer suited to the altered circumstances; with the advance of scientific knowledge, and greatly altered economic conditions, greater liberty of action must be granted to the intelligent, up-to-date farmer, and the cast-iron conditions to be found in too many leases, even to-day, must give way to more modern ideas.

In writing on this subject twelve years ago, the writer of the present article strongly advocated, wherever practicable, the desirability of sowing out a section of the farm as a timothy meadow. Subsequent experience has more than confirmed the views then expressed. In some seasons the growing of green crops on strong clay land is wellnigh impossible, and even when possible is at best very expensive.

The system of summer fallow is not now being practised to nearly the same extent as formerly. On light soils this wasteful system should never be resorted to at all, except when it is followed by an autumn catch crop, to be eaten off with sheep. On the strong clays fallowing should only be resorted to when any section may have become so foul as to require thorough cleaning by repeated ploughing. And even on strong clay, where not intended for autumn wheat, a catch crop of some kind should be sown before midsummer along with grass seeds to be eaten off with sheep. In this way the considerable amount of nitrogenous matter that would get washed out of the soil by the autumn rains is saved, and some return is got from the catch crop towards the current year's rent.

The hard-working, industrious dairy farmers farming on the strong cold clays of Ayrshire and parts of Lanarkshire have long since demonstrated that that class of land can be cropped and kept fairly clean without either resorting to summer fallow or putting the land through a course of green cropping. By liberal manuring of the hay crop a full yield is obtained and the land is kept clean. It has been found by practical men that there is no system by which crop-sick heavy land can be cleaned and restored to a high state of fertility more effectually than by putting it down for a series of years to permanent timothy, and treating it liberally all the time.

Duration of Timothy Meadows.

A paying crop of timothy hay may be obtained according to circumstances, class of land, situation, and treatment, for six, eight, ten, and in some cases fifteen and twenty years in succession. Whenever the crop shows signs of deterioration the land should be broken up and put through a course of cropping, another section of the farm having meanwhile been sown out with timothy. The writer has seen a meadow broken up after ten years continuous cropping, which, prior to being sown with timothy, was a hard clay soil, with a yellow tilly subsoil showing itself at a depth of 6 to 7 inches, and which was occasionally brought to the surface by the ploughshare, but now, after being all these years producing annually a crop of 3 to 3½ tons per acre of excellent hay, has the appearance of rich friable loam, quite 8 inches in depth and without a trace of subsoil coming to the surface when ploughed. The enormous mass of rootlets which has been developed in the soil penetrating to a considerable depth entirely changes its character, and renders it infinitely more friable as well as more easily worked.

Crops after Timothy.

Enormous crops of beans or mashlum can be grown after a timothy meadow has been broken up. Indeed where the land has been liberally treated whilst it was under hay, only such crops as beans or mashlum can with safety be grown in the succeeding year, as any of the other cereals would be apt to lodge and waste. We have seen instances of land that was by no means as clean as it ought to have been when it was sown out with timothy, yet after 5 or 6 years continuous cropping and liberal treatment in the matter of top-dressing, show not the slightest trace of coltsfoot, thistles, and other objectionable plants with which it was previously infested, these having evidently got quite effectually smothered out.

The Merits of the Crop.

So far we have pointed out the beneficial effect produced on the land itself by a course of timothy growing, especially on stiff clays. We shall now consider the crop itself, the preparatory treatment of land to be sown out, and the after treatment usually adopted in order to obtain that maximum return which every one should aim at securing.

Timothy though attaining its highest degree of perfection and yield on the deep rich loams or strong carse clays, can nevertheless be grown with a fair measure of success on cold clay soil at high altitudes, or on peaty soils adjoining moorland. It has long been recognised as one of the most nutritious of our cultivated grasses either in the form of pasture or as hay. Indeed no mixture of permanent grasses is complete without the addition of a few pounds of timothy per acre. But it is as a valuable fodder we propose dealing with it here.

A well-managed timothy meadow has been described as an almost indispensable adjunct to the modern dairy farm. Stock of all kinds prefer good timothy hay to any other kind of fodder, and where, as in these days, large studs of breeding horses and young stock are kept, a good supply of timothy is most wholesome and valuable, besides being a most economical winter food.

The question is frequently asked, How long might a plot sown out with timothy be expected to yield a satisfactory crop of hay? To this no very definite answer can be given, so much depends on the nature of the soil, the situation, and the treatment the land receives.

Of the saving effected by having a section of the farm under timothy there can be no question: on some farms it means the dispensing with one pair of horses and the saving of the wages of a man. Moreover, timothy hay is not ready for harvesting till the ryegrass hay has been secured, and the cutting and ricking is got done at a time of the year when other work is not pressing.

Preparation of Land for Timothy.

Land to be sown out with timothy should be drained and thoroughly cleaned, as if foul there is always a danger of weeds and foul grasses gaining the supremacy and choking out the more valuable plants. Timothy is usually sown out with a white crop following a green crop, which should be well manured, and where the land is unsuitable for green cropping, it may be summer fallowed in the early summer, dunged and limed, and the seeds sown if possible by the middle of June. In such a case the seeds could be sown along with a catch crop such as barley, tares, and rape, either to be cut in a green state or consumed on the land with sheep.

Manure for Timothy.

Where it is not possible or convenient to apply farmyard manure to the preceding green crop or summer fallow, there might be substituted a dressing of artificial manure, of say 6 to 8 cwt. per acre supers, and 3 to 4 cwt. kainit. In sowing out with a white crop, especially on land where the grain will be liable to lodge, it is desirable to sow some of the new varieties of oats that will not grow too thickly on the ground, and that is possessed of a stiff straw that will stand well up. The plant of timothy in its early stages is very easily smothered.

It is very essential to have the land reduced to a fine tilth before sowing the grass seeds, and also to have it well rolled. The subsequent harrowing in of the seeds should be done by specially light grass-seed harrows, or for preference chain-harrows, there being great danger of many of the tiny seeds being buried if harrowed on rough land by too heavy or long-tined harrows.

Quantity of Seed.

There is still great diversity of opinion amongst practical men as to the quantity of seed that should be sown per acre. On one hand you hear of 10 lb. per acre proving an ample seeding, whilst on the other you hear of 20 lb. to 24 lb. per acre being thought necessary. As a result of considerable experience the writer recommends a middle course—viz., 16 lb. per acre (Scotch seed for preference)—but along with the timothy it has been found a good plan to sow 12 lb. Italian ryegrass and 6 lb. to 8 lb. red and alsyke clover. This, however, is only to be recommended where an aftermath is desired after the first cutting. It is right to mention that there have been cases where a too bulky aftermath of Italian grass and clover partially choked out the timothy, and left a too thin root of plants for the succeeding year's crop.

Where the land has been well manured prior to sowing out and a dressing of lime applied, it might be allowed to take its course for the first year, as a heavy dressing of artificial manure might force the Italian and smother the timothy in the first year of its growth; but after it is thoroughly established in the soil it can hardly be overdone with either farmyard dung or nitrogenous manures. Some growers advocate an application yearly of 15 to 20 tons dung and 1 to 2 cwt. nitrate of soda, applied in two dressings from middle of April to first week in May. In other cases where this plan is not convenient, farmyard manure may be applied every alternate year and artificial manures in the intervening years. Farmyard manure is best applied in autumn before growth has ceased, or in spring when growth becomes active. The manure should not be allowed to lie in coops or heaps but should be properly spread, and as early as practicable be harrowed with chain-harrows in order to break the lumps and ensure more even distribution.

It is within our knowledge and experience that where dung is not available for the hay crop, very successful crops of timothy can be raised by the use of artificial manures alone. The most reliable we have found to be 4 to 6 cwt. supers and 3 to 4 cwt. kainit applied during autumn or early winter, and 1½ cwt. to 2 cwt. nitrate of soda applied in spring. We have used basic slag phosphate and kainit in addition to nitrate with marked success on one field, whilst on an adjoining one there was little appreciable benefit.

Unless the crop is well nourished and a maximum yield obtained, other forms of plant life make their appearance to the detriment of the hay crop. After a few years a soft bottom grass frequently makes its appearance, but this can be considerably checked if in early spring a double turn of ordinary harrows is given to the meadow, followed in a day or two with a turn of a heavy roller. By this means the fog and soft grass are considerably thinned out. If, however, the soft grass and fog persist in growing, the meadow might then be profitably broken up and put through a course of cropping.

It has been the strange experience of many growers of timothy that where a plot which had produced successful crops has been broken up, and after two or three years sown out with timothy again, the same good results have not followed the second seeding,—indeed there are cases on record where total failure has resulted. It is not easy to explain this occurrence, but the fact remains, and we would strongly recommend a five or six years' course of cropping, finishing with a turnip crop, before an attempt be made to resow with timothy. A liberal application of lime in some form should always precede re-sowing.

Harvesting Timothy Hay.

Timothy hay should be cut just when the flower or bloom is blowing off. If cut before this it is soft and immature, and if left longer uncut it is apt to become hard and woody in fibre. Being strong in the straw it is less liable to suffer damage in the making from wet weather than other kinds of hay, and in good weather it can be very speedily handled and secured from danger. Hay grown on strong land, if clean and free from soft bottom grass, can be put in ricks of 60 to 80 stones within twenty-four hours after being cut, and when built on bosses or triangular rick centres there is no danger whatever of its heating. With such prompt handling the hay is secured with a nice green colour, and all the natural sap is retained.

It is never good policy in our changeable climate to cut down too much at a time, and a good plan is never to cut more in one day than the available hands are able to rick the succeeding day. We once had experience of a most uniform plot of 5 acres of splendid hay, one half of which was got ricked promptly, but rain came on and the remaining half was not secured for two days, with the result that the portion which lay exposed to alternate sun and shower depreciated in weight fully 10 cwt. per acre.

Yield of Timothy.

As to actual yield of crop as much as 5 tons per acre have been grown, but this is exceptional, and 3 to 3½ tons per acre may be considered an average yield on the best class of land, whilst on poorer and less suitable soil 2 to 2½ tons may, with good management, be reckoned on. We know of no fodder crop that will yield such a return at so little outlay, there being no annual cultivation of the land and no annual outlay for seed.

Whilst there can be no doubt that the trend of the times points to a decreased demand for fodder from our large cities and centres of industry, still there will continue to be about our dairy and stock-raising and beef-producing farms an ever-increasing necessity for a plentiful and cheaply-produced supply of the very best of fodder, and on these grounds the writer has the utmost confidence in recommending it to those who have not hitherto given the growing of timothy hay a trial.

CROP YIELDS AT HOME AND ABROAD.

By William E. Bear, Hailsham.

Causes of Variation.

Among the many causes of difference in the yields of the several crops of the farm, as shown by averages for a series of years, variations of climate must be regarded as the most potent; for although the degree of natural fertility in the soil counts for a great deal, and the farmer can do much to remedy natural deficiencies by artificial means, no crop can be grown to perfection out of doors in a climate unsuited or only partially suited to it. This statement may be illustrated by well-known facts within the confines of a single country. For example, no excellence of farming on the most fertile land in Essex would produce crops of swedes or yellow turnips equal in weight to those grown under ordinary conditions in less rich soil in Cumberland or Westmoreland, one season with another; and, again, on no considerable tract of land in the south of France can such crops of wheat be produced as are grown in the northern departments of that country. Conversely, in relation to vegetables which love a warm climate, the south in either of the two countries possesses advantages not to be overcome by natural or artificial soil fertility.

Much more striking illustrations of the potency of climate upon crop production can be found, of course, when different countries are taken into consideration. The cereals grown in Great Britain can be produced in full abundance only in a temperate climate. They require a prolonged season of growth, so that moderation of summer heat is essential to their full productiveness. An attempt to produce in the Southern States of America such crops of wheat, barley, and oats as are grown in England, Holland, or Belgium could never succeed; and equally futile would it be for South Australia to enter into rivalry with New Zealand in respect of yields per acre of these crops. On the other hand, there are cereals, such as maize, which, when ripened at all in the cool climate of England, would fall far short of the production in those sections of the United States in which the summer temperature is much higher than in this country. Or, if we take into consideration such market-garden crops as tomatoes or pumpkins, the best of English growers could not produce out of doors in the most fertile soil such great crops as are grown without any trouble on the other side of the Atlantic.

There may be some question as to whether natural soil fertility or good farming stands next to climate in influence upon crop yields. If extreme differences only are taken into account, the former would have to be given the second place —next to climate, that is; for it would be hopeless, by the highest degree of good cultivation and the most profuse manuring, to produce in some of the poorest soils in Scotland such great crops of various kinds as are grown easily in the Lothians. But taking whole countries, with the variations of soil in each, into comparison, it is doubtful if there be one sufficiently superior to any other in soil fertility to outweigh the differences between good and bad farming, provided that climatic advantages are equal.

It has often been said that British farmers are the best in the world, and that this is proved by crop statistics. Probably the main statement is true; but it will be shown presently that if we take crop statistics, with all their doubtful accuracy, solely into account, British farmers must admit that they have equals, if not superiors, in two or three countries. There is reason to believe, however, that in the very few countries which are apparently exceptions to the rule that crop yields in Great Britain are much higher than those of other parts of the world, soil advantages or questionable accuracy in the statistics must be taken into account in any consideration of relative farming efficiency.

IMPERFECTIONS IN AGRICULTURAL STATISTICS.

Any investigator who seeks to compare the crop yields of different countries finds great difficulties, in consequence of the shortcomings in the agricultural statistics of many of them. Some improvement has taken place since the International Statistical Congress was established; but there are still some countries for which the acreage is given only at intervals, and more for which annual returns have been issued only during the last few years. Estimated production has long been given yearly, officially or commercially, for every country of importance to the corn trade of Europe; but without the acreage for each year, no average of yield per acre can be ascertained. Moreover, Great Britain is probably the only country in the world in which the acreage of crops is calculated from farm-to-farm returns—the only satisfactory method. Even in this country that method is not applied to the yields of crops as it should be; but it is of greater importance to obtain as nearly as possible the actual acreage than to get at the production precisely, because there are means of testing the approximate accuracy of estimates of the latter, whereas there are no data for testing those of the former. At least, this is the case with respect to wheat and other cereals consumed in some countries by human beings, as the imports and exports of each cereal year are known quantities, while the annual consumption for food and seed can be calculated pretty closely. That what is worth doing at all is worth doing well, is in no respect more true than in reference to the collection of statistics, and it is to be hoped that the annual conferences of European statisticians will in time result in a great improvement in this connection.

The shortcomings in question are clearly indicated in a table to be found in the Agricultural Returns of 1904, issued as recently as July 1905. For many countries no details of crop acreage or production could be given in that volume for a later year than 1903, and for some particulars could not be supplied in reference to as many as three consecutive years. Therefore, in a footnote to some comparative tables showing as nearly as possible the crop yields of various countries, so far as wheat, rye, barley, and oats are concerned, it had to be explained that the averages per acre were based on "the returns of the five nearest available years," unless otherwise noted. Notes to these tables show that, in several cases, the calculations could be made only on returns of two or three years, while in two the necessary details were available for only one year. Again, from the separate tables for the several countries it is clear that the five years were not in all cases consecutive.

With such shortcomings in reference to the cereals, it is not surprising to find still more serious imperfections in relation to other crops. Farm products which are of great importance in some countries are grown to only a small extent or not at all in others. Therefore the attempt to compare the yields of green crops and hay in different countries is beset by even more difficulties than are found in dealing with corn crops.

THE UNITED KINGDOM.

So far as the agricultural statistics of our own country are concerned, there has never been any authoritative challenge of their approximate accuracy, at any rate since our Board of Agriculture was established. If they had ever been far wrong in relation to wheat, commercial authorities would not have failed to detect the error when surveying the details of distribution; and if they are substantially accurate for one crop, they may fairly be trusted for another. Although crop yields in Great Britain are not directly returned to the Board of Agriculture by growers, information concerning them is collected by a large number of local officers, who make inquiries as to actual results among farmers and owners of threshing machines. As for Ireland, returns of acreage and yield alike are made by the constabulary, who have the best of opportunities in all parts of the country of acquiring the necessary information.

At the time of writing, the latest official details for the United Kingdom, excepting the Isle of Man and the Channel Islands, which are never covered by the produce statistics, are those of 1904, which include the ten years' averages up to 1903. These are shown in the annexed table:—

TEN YEARS' AVERAGES OF ESTIMATED YIELDS PER ACRE, 1894-1903.

		England.	Wales.	Scotland.	Ireland.	United Kingdom.
Wheat . . .	bush.	30·95	24·99	37·58	32·37	31·14
Barley . . .	"	33·00	30·13	35·77	39·24	33·62
Oats	"	41·09	33·25	36·50	44·40	40·51
Beans	"	28·02	24·41	32·68	37·86	28·29
Peas	"	26·35	19·79	25·38	25·44	26·20
Potatoes . . .	tons	5·80	5·43	5·67	3·83	4·69
Turnips . . .	"	11·96	14·74	14·69	14·93	13·10
Mangolds . . .	"	18·36	16·12	17·10	16·33	18·13
Hops	cwt.	9·12	...	...	...	9·12
Hay from clover, &c. .	"	29·03	24·03	31·88	43·55	32·28
Hay from permanent grass	"	24·05	18·58	28·87	47·09	29·59

The weights of the several bushels are 60 lb. for wheat and beans, 50 lb. for barley, 39 lb. for oats, and 63 lb. for peas.

The most remarkable feature of this table is the general superiority in the productiveness of the cereals attributed to Ireland, which would hardly be imagined, perhaps, by observers who have travelled extensively through the four divisions of the Kingdom when the crops were nearly mature. If the credited superiority is not due to the sanguine temperament of the people, it may be attributed to the fact that Ireland suffers less from droughty seasons than either England or Scotland, and less from over-wet ones than England, in consequence of the characters of the soil and the subsoil. It is true that there is a large area of fertile land in Ireland; but there is also much very poor land, as well as a good deal of wretched farming. Whatever the explanation may be, it has been noticed during a long period that general reports on the Irish harvest have nearly always been favourable, not excepting most of the seasons in which many crops in England or Scotland, or both, have been partial failures. While the table represents that Scotland is ahead of England for wheat, barley, and beans, but below it for oats and peas, the figures indicate that Ireland produces more bushels per acre than Scotland of all the cereals excepting wheat, of which neither country grows any considerable area. Ireland stands very low for potatoes, but is represented as beating each division of Great Britain for turnips, and, as might be expected, for both sections of the hay crop.

Ten years' average yields, of course, vary to a slight extent in accordance with the prevailing characters of the sets of seasons to which they relate. They would also be affected by any general improvement or deterioration in the farming of the country; and, as all the cereals but oats have been contracted in area, it might be expected that the averages of the last ten years would be higher than those of the preceding decade, unless the seasons were on the whole less favourable, in consequence of some of the least productive land having been taken out of the arable area. It is obvious, however, that one of these influences might counteract another, or all might work in the same direction. Now, the Produce Statistics were first collected in 1884, and although no accounts of the ten years' averages were presented in the returns for 1893, the estimates for each year of the decade then ended were given, allowing the necessary calculations to be made. It seems worth while, then, to compare the decennial averages of 1893 and 1903 for the United Kingdom, as follows:—

Crops		1884-93	1894-1903	Increases for 1894-1903
Wheat	bush.	29·24	31·14	1·90
Barley	"	33·23	33·62	0·39
Oats	"	38·58	40·51	1·93
Beans	"	25·81	28·29	2·48
Peas	"	25·10	26·20	1·10
Potatoes	tons	4·59	4·69	0·10
Turnips	"	13·05	13·10	0·05
Mangolds	"	16·91	18·13	1·22
Hops	cwt.	7·38	9·12	1·74
Hay from clover, &c. . . .	"	30·51 [1]	32·28	1·77
Hay from permanent grass . .	"	27·45 [2]	29·59	2·14

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[1] For nine years, hops not having been estimated before 1885.

[2] For seven years, the hay crop not having been divided before 1886 in Great Britain, or before 1887 in Ireland.

How are we to account for the unanimous superiority of the later decade as shown by the table? For the cereals the seasons appear to have been on the whole more favourable in 1894-1903 than in 1884-93. There were bad wheat crops in 1886, 1892, and 1893, while there was only one decidedly bad in the later decade, that of 1895, though the crop of 1900 was below the mark. Only one really bad barley crop was grown in either decade, that of 1893. Beans yielded very poorly in four years in the earlier decade, but only once in the later one were they as near a failure, and once somewhat poor; while peas were strikingly deficient twice in the former, but only once in the latter. With potatoes the conditions were reversed, the only very poor crop in 1884-93 being that of 1900, whereas 1894, 1897, and 1900 were very bad potato seasons, especially in Ireland. The differences in relation to roots, hops, and hay, so far as the lists of estimated yields indicate, were not striking, moderate variations being the rule in both decades; but the crop of 1893 was the worst in the twenty years. It seems clear that the advances in average yields shown throughout the table were not due entirely to seasonal advantages. Probably they may be attributed partly to improved knowledge of the use of artificial manures, and partly to a large area of the poorest land having been converted from an arable condition to pasture.

In the case of potatoes, a trifling advance has been obtained, in spite of less favourable seasons on the whole, in the later decade. As to hops, the considerable rise may be due to the more general and persistent practice of spraying. Lastly, it may be suggested that some allowance may be made for the diminished acuteness of agricultural depression in the later decade, incidental to a partial adjustment of certain expenses to diminished money returns, as this has probably left a wider margin for expenditure upon manures and feeding-stuffs.

FRANCE.

Various contributory influences may be suggested for the fact that the yields of crops in France are much smaller than those of the United Kingdom. In the first place, at least so far as the cereals are concerned, a large portion of the former country is subject to a much higher temperature than the latter. Secondly, a very much larger proportion of the land in France than in this country is under arable cultivation, including much inferior soil. Out of about 85,000,000 acres under crops and grass in France about 64,000,000 are under crops other than hay, and only about 21,000,000 acres in pasture, including rough grazings. Land too poor to be cultivated in this country pays in the neighbouring one, and the small yields of such land bring down the averages for the country at large. About two-fifths of the total are under corn crops—over 33,000,000 acres—about 16,000,000 acres being now devoted to wheat alone. It is probable, too, that the crops grown by the vast number of peasant-proprietors are, as a rule, though not in all cases, inferior to those of the larger farmers.

Accepting the preliminary official estimates of the wheat, barley, and oat crops of 1905, the latest ten years' averages are: 19·57 bushels for wheat, 21·99 for barley, and 26·19 for oats, comparing with 31·14, 33·62, and 40·51 for the United Kingdom for the decade ended with 1903. Potatoes in France for ten years to 1903 averaged 3·26 tons per acre, against 4·69 for the United Kingdom; mangolds (nine years to 1902) 10·04 tons, against 18·13; hops (ten years to 1902) 8 99 cwt., against 9·12; hay from clovers and temporary grasses (eight years to 1902) 29·40 cwt., against 32·28; and hay from permanent grass (seven years to 1901) 28·15 cwt., against 29·59.

There is much evidence, however, to show that French agriculture has been recently, and still is, improving rapidly. One sign of the improvement is to be seen in the following compilation, showing the average yields of wheat in decades, the figures representing bushels per acre:—

1831-40	14 22	1871-80	16 26
1841-50	15·24	1881-90	17·43
1851-60	15·71	1891-1900	17·93
1861-70	15 91	1901-05 (5 yrs.)	19·57

Although the area of the wheat crop in France in the last few years has been about a million acres less than it was for a long time down to 1900, the production has been kept up well by the increased yield per acre, so that imports have been quite insignificant. During the last seven cereal years the net imports have reached a million quarters only three times, in one year being just over two million quarters. As French millers would be unwilling to do entirely without hard foreign wheat, the acreage of the home crop may be regarded as sufficient.

In a remarkable article on "The Agricultural Prosperity of France," by M. Eltzbacher, in the 'Contemporary Review' for November last, much evidence is given as to that prosperity, which is contrasted with agricultural depression in England. The writer attributes the comparatively fortunate state of agricultural affairs in the former country partly to the high duties on all classes of agricultural imports, partly to the existence of a vast number of peasant-proprietors, partly to the great advance of co-operation through the agricultural syndicates now spread all over the country, and partly to the fostering care of agriculture by the Government in reference to education, stock-breeding, experiments and demonstrations, bounties of various kinds, and, in short, in every conceivable way. In 1884, he says, the year before the first moderately high tariff was established (since raised greatly), the agricultural imports of France were 441,000,000 francs greater in value than the corresponding exports; whereas, in 1900, the value of these exports exceeded that of the imports by 100,000,000 francs. There cannot be any question as to the high tariff having kept up the acreage of corn crops, whatever effect it may have had upon the improvement of farming.

SPAIN.

In this country from 9 to 9½ million acres of wheat, 3¼ to 3½ millions of barley, a little under or over 1 million of oats, and nearly 2 million acres of rye, are usually grown. The yields are extremely low. According to the table in the Agricultural Returns previously mentioned, the averages for four years ended with 1902 were 12·70 bushels of wheat per acre, 18·91 of barley, 16·24 of oats, and 12·02 of rye. There are no details for potatoes, roots, or hay.

GERMANY.

German agricultural statistics leave much to be desired, except in relation to the most important crops, the figures for which are given regularly. From 4 to 5 million acres of wheat, 4 to 4¼ millions of barley, 10 to 10½ millions of oats, and 14¾ to 15 millions of rye, are grown in Germany. The yield of corn is much higher than it is in France, approaching pretty closely that of the United Kingdom. The wheat crop of 1903 was an exceptionally poor one, and its deficiency made the average in the table noticed above lower than it should be. For the five years ending with 1904 it comes out at 28·25 bushels per acre, or 0·24 higher than for the five years ended with 1903, as given in the table. This is 2·89 below the ten years' average for the United Kingdom. The average for barley is put at 32·83, or only 0·79 less than that of our own country; and that of oats is 39·69, or 0·82 below ours. Rye is put at only 22·33 bushels, but for the five years ending with 1901 it is 28·56. This is one of the very few instances in which the yield of rye has been found equal to that of wheat, and the only way of accounting for the extensive growth of this inferior cereal in many Continental countries is that it is probably grown on land considered too poor for wheat, and without manure.

The German average for potatoes, 5·17 tons per acre, beats that of the United Kingdom by 0·48, but is fully half a ton less than that of Great Britain. Turnips appear to be grown on only half a million acres, and no return of production is given. For mangolds the only recent return is that of the census of 1900, which puts the area at 1,230,539 acres, yielding 8·40 tons per acre. It is strange to see that sugar-beet gave a slightly higher yield. Hops come out at only 4·2 cwt.; but for hay from clover and temporary grasses the average is 34·22 cwt. per acre, and for hay from permanent grass it is 31·99 cwt., showing that each division of the hay crop is more productive in Germany than in this country. There is no doubt that agriculture in Germany has greatly improved, or that it is in a comparatively prosperous condition.

AUSTRIA-HUNGARY.

The statistics of Austria and Hungary are collected and issued separately. Austria grows 2,600,000 to 2,642,000 acres of wheat, a little under or over 3,000,000 acres of barley, from 4,500,000 to 4,700,000 acres of oats, about 4,500,000 acres of rye, and a little over 2,800,000 acres of potatoes. The averages for five years are 17·49 bushels per acre for wheat, 21·83 for barley, 23·07 for oats, and 19·07 for rye. Potatoes come out at 3·59 tons, and the two classes of hay at 25·70 and 22·52 cwt. Corn crops cover less than 17,000,000 acres out of more than 45,000,000 of cultivated area, including 14,000,000 acres of permanent grass. Only late turnips as a second crop are included in the statistics of Austria, and these on an extremely small area; while mangolds and carrots are classed together on less than 300,000 acres, so that the average for mangolds alone cannot be given.

Hungary grows about 9,000,000 acres of wheat, about 2,700,000 acres of barley and oats respectively, 2,800,000 acres of rye, and some 1,500,000 acres, or a little less, of potatoes. Maize is a very important crop in Hungary, occupying about 6,500,000 acres, as compared with about 824,000 acres in Austria. The total under cereals (pulse in all cases being included) is 24 to 24¾ million acres, out of a total of some 40,000,000 for all crops and grass for hay enumerated in the returns which reach this country. As turnips are not named, and grass for grazing is also omitted, the total cultivated area cannot be given.

Permanent grass for hay covers over 8,000,000 acres. The averages for five years are 17·80 bushels per acre for wheat, 21·60 for barley, 26·60 for oats, 16·28 for rye, 20·87 for maize, 3·15 tons for potatoes, 10·12 tons for mangolds, 30·14 cwt. for clover and lucerne hay, and 24·14 cwt. for hay from permanent grass. In both Austria and Hungary the yields of crops come out much lower than those of the United Kingdom.

BELGIUM.

Here we have one of the two or three countries credited with higher yields than those of the United Kingdom for several crops; but, without knowing how the estimates are made up, they must be accepted with reserve. Wheat comes out for the four years ended with 1903 at 27·43 bushels per acre, a quantity considerably below the average for the United Kingdom; but the reckoning for barley is 48·91 bushels, and that of oats is no less than 54·95 bushels. Belgium, no doubt, is a country of intense cultivation, only about 4,300,000 acres being under crops and grass; and it is one of the most densely populated countries in the world. Possibly the cereals are grown mainly after market-garden crops profusely manured, which would account for the very high estimates for barley and oats.

In 1903 wheat was grown on only 355,260 acres, barley on only 79,709 acres, and oats on no more than 705,467 acres. It is curious that in so small and so highly cultivated a country room should be found for 620,000 to 655,000 acres of rye, yielding 31·70 bushels per acre. It would be interesting to learn why rye-bread is as extensively consumed in Continental countries as it is—whether from choice, or because it is cheaper to produce. In Belgium the yield is higher than that of wheat; but the converse is the case in all but three or four of the countries in the world for which details are available. Such fancy rye cakes and biscuits as the well-to-do classes consume are very tasteful; but it is difficult to imagine a preference over wheaten bread for such hard and coarse rye-bread as the peasantry consume. After all, however, it is more sustaining and wholesome than the trashy bakers' bread upon which the English working classes mainly subsist.

Belgium is further credited with 6·77 tons of potatoes per acre, thus again beating Great Britain, if the estimates are to be trusted. Mangolds, at 18·06 tons per acre, are only slightly below the standard for the United Kingdom. Turnips, with about 9 tons per acre, hardly count in the comparison, as they include roots grown as a second crop. Clover hay comes out at 38·87 cwt., and permanent grass hay at 30·20 cwt., both yields being a little above our averages. The yield of sugar-beet appears to be a little over 12 tons per acre, comparing very poorly with that of mangolds. The former crop possesses interest in this country, now that there is some talk of trying the beet-sugar industry in England.

One reason for discrediting the Belgium estimates is that the figures given for hops for the four years ended with 1903 work out at 15·58 cwt. per acre. It is difficult to believe that if so very high an average had been produced, the area under hops would have fallen from 10,337 acres in 1880 to 9151 acres in 1895, and to 5476 acres in 1903, as such a yield would have given a money return about four times as much as that of an ordinary farm crop.

HOLLAND.

This is the only other European country credited with several crop yields superior to those of the United Kingdom. The area under cereals in 1903 was only 1,327,600 acres, out of a total cultivated area of 5,238,564 acres, 2,937,378 acres being in permanent grass. Wheat was grown on only 137,129 acres, barley on 78,850, oats on 356,908, and rye on 538,771. As Holland has a great proportion of fertile soil, it is strange that so large an acreage is devoted to rye. Potatoes are extensively grown in proportion to the area of arable land, as they usually cover 370,000 to 390,000 acres, the acreage in recent years being only about 30,000 acres less than that of England, and more than two and a half times the acreage produced in Scotland. Turnips are not separately returned, but are lumped together with mangolds and "green forage."

The estimated yields of the five years ended with 1903 work out at 29·82 bushels for wheat, 46·06 for barley, 52·85 for oats, 24·97 for rye, 5·54 tons for potatoes, 10·99 cwt. for hops, and 12·58 tons for sugar-beet. No returns of yield are given for other roots than sugar-beet or for hay. The estimates for barley, oats, and rye are second only to those of Belgium among all the countries of the world. The yield of potatoes comes out a little below that of Great Britain, and, judging from the small yield of sugar-beet, the root crops of Holland are greatly inferior to those of the United Kingdom. There is no doubt that the fertility of the soil in Holland is generally much higher than it is in this country.

DENMARK.

The agricultural statistics of Denmark leave much to be desired, as the acreage of crops appears to be given only at quinquennial periods, though estimates of production appear annually. The total area under crops and grass, exclusive of garden land, was 6,973,200 acres in 1901, of which 32,171 acres were under wheat, 693,720 under barley, 1,066,667 under oats, 671,893 under rye, and 351,798 under mixed corn. The total of cereals was given as 2,866,899 acres; but vetches, as well as peas, beans, and buckwheat, were included; clovers and temporary grasses covered the great proportionate area of 2,287,440 acres, and permanent pasture 585,453 acres.

In consequence of the lack of annual returns of acreage, no average yields per acre can be given. In 1901 the estimates were 28·18 bushels for wheat, 30·92 for barley, 33·75 for oats, and 23·79 for rye. Supposing the bushels of potatoes returned were bushels of 56 lb., the yield was a little under 4 tons per acre; while clovers and temporary grass hay yielded about 30 cwt., and permanent grass hay about 24 cwt.

SWEDEN.

Corn crops appear to cover about one-third of the total area of crops and grass in Sweden, which was 12,328,820 acres in 1903. A small production is given for "other kinds" of corn than wheat, barley, oats, rye, beans, peas, and mixed corn, while the area, obviously a trifling one, is not stated. In 1903 there were 200,440 acres of wheat, 528,699 of barley, 2,035,487 of oats, 1,013,411 of rye, over 66,000 of beans and peas, 334,843 of mixed corn, 382,519 of potatoes, 129,062 of all kinds of roots, 3,053,723 of clovers and grasses under rotation, and 3,522,558 of permanent grass.

The averages for five years are 24 bushels of wheat per acre, 24·40 of barley, 28·98 of oats, 22·35 of rye, and 3·43 tons of potatoes. No averages can be given for roots or hay, as the figures are too much mixed. They appear to be distinct for hay from permanent grass in 1899 and 1900; but the yield works out at less than 8 cwt. per acre. If this be the actual yield, it must include that of a large proportion of very poor pasture, of which there is a great deal in Sweden.

NORWAY.

Out of a total area of nearly 77,000,000 acres, exclusive of lakes, in Norway, about 16,845,400 acres are in woods and forests, and only about 2,272,400 under crops and grass. All the cereals covered no more than 409,074 acres in 1900, the latest return of area, while 90,661 acres were devoted to potatoes, 3880 to turnips, 21,901 to green fodder crops, and 98,259 to rotation grasses. The area of permanent grass is not given, but apparently it is fully 1,500,000 acres.

As acreage returns are given only in census years, no estimates of average yield are practicable, except by taking years at wide intervals. According to the table in the Agricultural Returns of Great Britain, no estimates for wheat or rye were given, as their production was lumped together. The yield of barley in 1900 was put at 38·93 bushels per acre on 97,654 acres; but as no separate return of production in 1900 appears in the statement of total areas and production, but only the annual averages for 1896-1900, for which there is no corresponding average acreage, it is not clear how this estimate was made.

The official Norwegian figures, as reproduced in our Agricultural Returns, are so perversely presented that there is no single year since 1890 for which both area and production are stated for any crop, and it is extremely improbable that 38·93 bushels of barley per acre have been grown as an average on all the area of that crop in the best of harvests, the soil of Norway being generally very poor. Moreover, the yield of oats is put at 38·33 bushels, or less than is credited to barley, which is further evidence of the exaggeration of the barley yield. Some years ago the separate figures for 1865, 1875, and 1890 were given, and these work out at 26·51 bushels per acre for wheat, 32·03 for barley, and 39·48 for oats, estimates which are probably much exaggerated. The average areas for those years were 11,303 acres of wheat, 127,786 of barley, and 228,006 of oats. For 1900 they were 12,533 acres of wheat, 97,654 of barley, and 240,576 of oats.

RUSSIA.

In the seventy-two Governments of the Russian Empire, including Poland, Siberia, and the Caucasus, about 57,000,000 acres of wheat, 44,000,000 of oats, 23,000,000 of barley, 75,000,000 of rye, 6,000,000 of buckwheat, 8,500,000 of millet, 3,350,000 of maize, 2,690,000 of peas, and nearly 10,000,000 of potatoes are usually grown. The statistics of production are of questionable accuracy. Time after time a season of unfavourable crop reports has been followed by the official announcement of extraordinary production, greatly to the astonishment of commercial authorities. In the season just past, for example, reports from large divisions of the country were very unfavourable for wheat as well as for rye, Moreover, the Central Statistical Bureau, in a preliminary report issued in September, estimated the wheat crop at 65,000,000 quarters, and rye at 75,000,000; whereas in the final report by the same official authority, wheat is credited with 79,235,000 quarters, and rye with 85,730,000. Much higher estimates, however, were those of 1904, when wheat was reckoned at 82,820,000 quarters, and rye at 117,280,000. Up to 1904 rye had been over a thousand million quarters in five years out of six, according to the official report. Oats in 1904 were returned at 118,500,000 quarters, the greatest crop ever grown.

Yields per acre are very small, the farming, as a rule, being of the most wretched description. In our Agricultural Returns the averages in recent years are put at only 9·05 bushels of wheat, 11·84 of barley, 15·67 of oats, and 11·16 of rye for

European Russia, exclusive of Poland; at 14·70, 17·13, 17·41, and 12·33 bushels for the crops of Poland in the same order as above; at 10·28, 15·69, 17·95, and 10·88 bushels in the Caucasus; and at 10·06, 13·40, 14·43, and 9·52 bushels in Siberia and the Steppes. Here, as in nearly all other countries, the yield of rye, to which an enormous expanse of land is devoted, is less than that of wheat, except in the Caucasus.

By working out the totals for the four years ended with 1903, the yield of potatoes is found to be only 2·44 tons per acre in European Russia, exclusive of Poland, and 3·24 tons in Poland; that of meadow hay comes out at 9·91 cwt. per acre in Russia proper, and 15·95 cwt. in Poland. For maize the returns are 8·46 cwt. per acre in European Russia and 7·53 cwt. in Caucasia. Poland does not grow maize to any considerable extent.

With such miserable rates of production from the land, it is not surprising that the peasant-farmers of Russia have a precarious existence, suffering from famine whenever there is a harvest much worse than usual.

ROUMANIA.

This country possesses much fertile soil, and the farming is obviously greatly superior to that of Russia. The area under cereals has considerably increased in recent years. In 1904 there were 4,252,900 acres of wheat, 1,319,500 of barley, and 1,051,500 of oats, while rye was grown on only 330,777 acres. Maize is an important crop in Roumania, that grain, like wheat, being extensively exported. In 1904 the area devoted to it was 5,171,595 acres. The averages per acre in recent years have been 15 bushels of wheat, 14·64 of barley, 21·09 of oats, 13·86 of rye, and a little over 16 bushels of maize, omitting the crop of 1904, which was nearly a failure, and would misrepresent the average in as short a period as one of five years. The figures for potatoes are not quite clear, but about 4 tons per acre appear to be grown. The yield of meadow hay is only 16·66 cwt. per acre. Neither mangolds nor turnips are enumerated among the most important crops, and sugar-beet is grown only to an unimportant extent.

SERVIA.

Agricultural statistics in Servia are not up to date, and apparently they are not officially collected. Maize is the most important cereal, from 1,000,000 to 1,445,000 acres being devoted to it, while wheat comes next with 700,000 to 800,000 acres. The yields per acre in recent years have been 12·02 bushels of wheat, 13·86 of barley, 16·58 of oats, 10·58 of rye, and 20·4 of maize. Only a little over 2 tons of potatoes per acre appear to be produced. There are no details for roots, and the figures for hay are not distinct.

BULGARIA.

Such agricultural statistics as are available for this country are belated. About 2,000,000 acres of wheat and a little more than half as much of barley are grown, with over a million acres of maize, and small areas of other cereals. The averages for such recent years as there are figures to show are 14 bushels of wheat per acre, 17·62 of barley, 19·73 of oats, 13·22 of rye, and 5·33 tons of potatoes.

ITALY.

The wheat, maize, and rice crops are the only ones returned annually for Italy, and figures of area are less regularly given than those of production. In 1903 Italy had 11,979,500 acres under wheat, 4,169,360 under maize, and 459,420 under rice. The averages for three years ended with 1903 are put at 13·20 bushels of wheat per acre, 10·60 of barley, 15·65 of oats, and 11·97 of rye; but it is stated that the figures are only approximate. Maize yields nearly 19 bushels per acre.

UNITED STATES.

It is commonly supposed that the agricultural statistics of the United States are thoroughly up to date, and superior to those of Great Britain. This, however, is a great mistake, as there is no approach at present in the former country to the farm-to-farm method of getting at the acreage of crops, which is the only satisfactory one, and the plan long followed in our own country. Consequently the acreage of a crop is not known with any considerable degree of confidence except in census years; and as the production is based, of course, upon estimates of yield per acre, the totals given are often misleading, and commercial men have very little trust in them. When the census of 1900 gave the acreage of crops for 1899, it was seen to be enormously greater for each of the principal cereals than that which had been reckoned by the Department of Agriculture, and the differences in estimated yield were correspondingly great, as shown below:—

	Department.	Census.	Census excess.
	ACRES.		
Wheat . .	44,592,516	52,588,574	7,996,058
Maize . .	82,108,587	94,916,866	12,808,279
Oats . . .	26,341,380	29,339,597	3,198,217
	BUSHELS.		
Wheat . .	547,303,486	658,534,252	111,230,766
Maize . .	2,078,143,933	2,666,438,294	588,294,371
Oats . . .	796,177,713	943,387,375	147,209,662

Was there ever a more complete exposure of statistical inaccuracy? If the census figures are to be trusted—collected as they were under a system much more thorough than the Department practised—the production of wheat was miscalculated to the extent of about 20 per cent, that of maize by over 28 per cent, and that of oats by over 18 per cent. Some improvement in estimating has been introduced since this exposure, but there is still a very rough way of reckoning the acreage. In his annual report, issued last autumn, the Secretary of Agriculture refers to the advantage of the census returns for enabling his Department to adjust estimates, and remarks that it would be still greater if the census were collected once in five instead of ten years. In a great agricultural country like the United States, however, the Department of Agriculture should be endowed liberally enough to enable it to collect statistics under a proper system.

For ten years before 1900 the wheat crop was so obviously underestimated by the Department, as shown by the distribution, that commercial authorities publicly rejected the official reckonings, and adopted totals exceeding them by many millions of bushels. The methods now used for estimating yield per acre are better than they were formerly, though the latest wheat crop is generally believed to have been overestimated.

Taking the official figures as they are, those of 1904 are 552,379,517 acres for wheat (increased last year to 683,311,000), 2,467,480,934 acres for maize, 27,842,609 acres for oats, 5,145,878 acres for barley, 1,792,673 acres for rye, 39,998,602 acres for hay, and 2,263,565 acres for linseed. In 1903 about 30,000,000 acres were devoted to cotton, and over 1,000,000 acres to tobacco. The potato crop of 1904 was estimated to have covered 3,015,675 acres. Roots are not commonly grown, though sugar-beet is cultivated in limited districts. The averages for ten years to 1904 are 13·43 bushels for wheat, 24·94 for maize, 25·02 for barley, 29·15 for oats, 15·18 for rye, and 25·18 cwt. for hay. Potatoes for the six years ended with 1904 are estimated to have averaged 3·70 tons per acre. Linseed for three years comes out at 8·83 bushels.

ARGENTINA.

No confidence can be felt in Argentine statistics, although the present statistician has done his best to improve the estimates. As a rule, preliminary reports of yield are greatly exaggerated, and have to be reduced accordingly later on. The reckoning for 1905-6 are 12,832,000 acres of wheat, 5,648,890 of maize, and 2,667,600 of linseed. Official estimates of wheat yield for five years ended with 1903-4 work out at only 10·96 bushels per acre. Probably this is the yield per acre sown. Some years ago a reckoning from the figures of eight years brought out an average of barely 11 bushels per acre sown, and 14·76 per acre reaped. No average can be given for maize or linseed. The yields of all three crops vary greatly in different seasons.

JAPAN.

This is the only Asiatic country for which agricultural statistics are presented. The latest year for which they are given in our Agricultural Returns is 1902, when 1,168,594 acres of wheat, 1,581,005 of barley, 1,672,500 of rye, and 6,976,118 of rice were returned. The yields of recent years are averaged at 17·85 bushels of wheat and 26 90 of barley. The figures for four years indicate 2·56 tons of potatoes.

ALGERIA.

In 1901 the area of wheat in this country was returned at 3,231,467 acres, and that of barley at 3,438,262 acres, oats and other crops being grown on only a small scale. Wheat is reckoned to yield only 7·88 bushels per acre; barley, 10·32; oats, 26·90; and rye, 10·47. Potatoes, judging from the figures for a few years, average only 1·08 ton per acre.

INDIA.

Among our colonies and dependencies India, as a great grain-producing portion of the Empire, may fitly be noticed first. In 1905 the area of the wheat crop was officially returned at 28,231,585 acres, a quantity exceeded only in Russia and the United States, and not approached in any other country. Moreover, this area does not cover vast tracts of land in some of the native states under British control, for which no statistics are collected. Over 70,000,000 acres of rice are grown in British India alone, about 7,500,000 acres of barley, over

6,000,000 acres of maize, and over 80,000,000 of other food grains, including pulse and the millets. Large areas also are devoted to oil-seeds, cotton, and other fibres. The average yield of wheat for the ten years ended with 1905, as indicated by total acreage and production in the great volume of statistics issued by the Indian Department of Revenue and Agriculture, works out at only 10·63 bushels per acre. Corresponding details are not given for all India with respect to other cereals, and the tables of local yields contain far too many blanks to allow of a trustworthy summary.

CANADA.

There are no general agricultural statistics for Canada, but only those of three of the main divisions—Ontario, Manitoba, and the North-West Territories (hereafter to be two new provinces, Alberta and Saskatchewan). There are no annual returns from Quebec, the Maritime Provinces, or British Columbia; but the production of cereals in these parts of the Dominion is unimportant.

In Ontario the area of the wheat crop has declined considerably since 1892, when there were 1,617,824 acres, as compared with 986,329 acres in 1905. Barley, covering 772,633 acres in 1905, has increased by about 273,000 acres since 1892, and oats by nearly 787,000 acres, that crop being now returned at 2,618,416 acres. The other crops strike the reader of Ontario reports as curiously small in expanse for a great agricultural province with a total area of 141,125,000 acres. Indeed, all the crop areas seem small for a province settled as long as Ontario has been, and only 13,643,069 acres were returned as cleared in 1903. In 1905 there were 374,518 acres of peas, 50,543 of beans, 101,292 of rye, 101,591 of buckwheat, 132,580 of potatoes, 135,348 of turnips, and 69,035 of mangolds. Hay, including clover, was produced on 2,926,200 acres in 1904, and 3,183,670 acres were returned as pasture.

As the Ontario Bureau of Industries gives estimates of average yields for the twenty-four years ended with 1905, it is a convenience to reproduce them as follows: winter wheat, 20·4 bushels per acre; spring wheat, 15·8; total wheat, 18·92; barley, 27·4; oats, 36·0; peas, 19·04; beans, 17·1; rye, 16·4; potatoes, 3·08 tons; mangels, 11·5; turnips, 10·8; hay (including clover), 29·6 cwt. The potatoes and roots are returned in bushels, and it is assumed that, as in the United States, potatoes are reckoned at 60 lb. per bushel. For mangolds and turnips the allowance is 56 lb. per bushel.

In Manitoba the wheat area increased from 1,010,186 acres in 1894 to 2,412,235 acres in 1904. Barley in the latter year was grown on 361,004 acres, and the area under oats was 943,574 acres, only 6293 acres being devoted to rye, and insignificant quantities to peas and maize. An account kept of the official estimate of wheat gives a ten years' average to 1904 of 18·45 bushels per acre, which is barely equal to that of Ontario, in spite of the boasted fertility of Manitoba. The yield, however, varies greatly in the latter province, which is subject frequently to severe frost shortly before the crop is cut. The yield of barley in recent years averaged 29·87 bushels per acre, according to the estimates; that of oats, 38·61 bushels; and that of rye, 18·31 bushels. It will be observed that, in the New as well as in the Old World, rye yields least among the cereals, and the wonder is that it is grown as extensively as it is.

In 1898 only 307,580 acres were returned as under wheat in the North-West Territories, which may be compared with the preliminary reckoning of 1,149,558 acres for 1905. The average yield of wheat for eight years to 1905, accepting the preliminary estimate for that year, comes out at 19·13 bushels per acre. The average of recent years for barley is given in our Agricultural Returns at 25·27 bushels, and that of oats at 34·76 bushels.

AUSTRALIA.

Previous to the harvest of 1896 New South Wales had never produced enough wheat for her own requirements. In 1895 only 769,298 acres were under wheat, and 172,614 acres were cut for hay; but in 1896 there was a great increase, the total sown being 1,027,439 acres. For 1905 the estimate was 2,220,000 acres, or not far short of three times as much as ten years before. Maize is the only other cereal grown on a considerable scale, and that is only up to about 230,000 acres. In considering the average yield of wheat in any of the countries of Australia, the effect of the prolonged series of droughty seasons which ended with the disastrous one of 1902 must be borne in mind. Six out of seven years up to that one were seasons of severe drought. But the yield is always low, the greatest ever returned for New South Wales having been slightly less than 18 bushels for 1903. An account kept of the official returns for ten years up to 1900 shows an average of 9·9 bushels per acre. That of maize for five years to 1903 was 25·55 bushels. For the same period the average of potatoes comes out at 2·08 tons.

In 1904 the total area sown with wheat in Victoria was 2,407,787 acres, of which 2,271,846 acres were cut for grain, as compared with 1,373,668 acres ten years before. The average yield for ten years to 1904 was 7·18 bushels, covering the miserable return of 1·29 bushels for 1902, and the extraordinary one of 14·40 bushels for 1903. About 48,000 acres of barley, 434,000 of oats, and 11,000 to 12,000 of maize are grown. Barley for ten years, not including 1904, 14·27; and oats, 20·54. Maize for five years to 1903 comes out at a yield so enormous that it must be measured without being husked. Potatoes on about 49,000 acres averaged 3·26 tons.

In 1904 the area sown with wheat in South Australia was 1,840,157 acres, 1,728,232 being reaped for grain. It is worth while to notice that the difference between the area sown and that which is reaped is a source of error in reckoning the yield per acre. A considerable area of wheat is cut for hay every season in all the Australian countries. For the five years ended with 1904 the yield per acre of the crop reaped for grain comes out at only 6·62 bushels. Other cereals are insignificant, and potatoes, averaging 3·44 tons per acre, are grown on only about 8000 to 9000 acres.

Queensland is a pastoral country, less than 622,000 acres having been under crops, apart from permanent pasture, in 1903. But wheat-growing is increasing, as the yield is higher than that of any other country in Australia. In 1904 the return was one of 150,958 acres, whereas as recently as 1901 it was no more than 87,232 acres. The yield was estimated at 17·65 bushels in 1903 and 14·24 in 1904, while the average for ten years is put at 15·77 bushels. Maize is grown to about the same extent as wheat, averaging 17·20 bushels per acre, according to the figures for five years to 1903. Potatoes come out at 2·10 tons per acre.

In Western Australia about 158,000 acres of wheat, 50,000 to 60,000 of barley, and 15,000 of oats are grown. The five years' average are 11·51 bushels per acre for wheat, 13·35 for barley, 17·27 for oats, and 2·90 tons for potatoes.

TASMANIA.

About 50,000 acres of wheat, 8000 of barley, 60,000 of oats, and 11,500 of peas are grown in Tasmania. Wheat in the five years to 1903 averaged 19·24 bushels per acre; barley, 24·29; oats, 29·36; and potatoes, 4·63 tons. Potatoes are grown on about 30,000 acres—a large area for the cultivated area of the colony. As in the cases of other Australasian countries, the figures for hay apparently include clovers and mixed seeds with permanent grass, and possibly some corn, so that the yields cannot be fairly compared with those which are given separately for the two divisions of the hay crop.

New Zealand.

If in Tasmania we have an example of the advantage of a temperate climate, as compared with that of Australia, for the production of the ordinary cereals, a still more striking one is afforded by the case of New Zealand. In addition, probably, the soil of New Zealand, on the whole, is more fertile than that of any other country in Australasia. At any rate, this is the only one of our colonies which rivals Great Britain in crop yields. The total area in occupation in 1904-5 was 36,511,154 acres, made up as follows: cereals, 871,656 acres; green crops, 623,066; fallow, 63,313; orchards, gardens, and plantations, 97,504; sown grasses, 12,310,039; native grasses, 36,511,154. There were 258,896 acres devoted to wheat, 32,201 to barley, 548,938 to oats, 11,840 to maize, 14,302 to peas and beans, 5479 to other cereals, 26,331 to potatoes, 447,244 to turnips, 9376 to mangolds, 131,588 to rape, and 9527 to other green crops. The total under crops other than grass increased very slightly during the last decade, 1,355,600 acres having been covered by them at the beginning of the period, and 1,494,722 at the end of it.

In the table of yields for the five years ended with 1903 given in the Agricultural Returns, the averages are put at 32·19 bushels for wheat, 35·11 for barley, and 41·18 for oats, making them superior to those of the United Kingdom. But on working out the figures for the ten years ended with 1904, it is found that wheat comes out at 28·63 bushels per acre, barley at 31·59, and oats at 35·81. Maize in five seasons averaged 42·79 bushels. There are no estimates of production for roots. Potatoes for five seasons average 6·26 tons per acre, or considerably more than the average for Great Britain, and about 1½ tons more than that of the United Kingdom.

Natal.

This is the only African colony for which systematic agricultural statistics for a number of years are available. Maize, Kaffir corn, and millet are the only important cereal crops. Less than 1000 acres of wheat and 2000 of barley were grown in 1903, with 9154 acres of oats and 383,979 of maize. The average yield of wheat in five years was only 10·92 bushels per acre, and that of barley was no more than 5·24 bushels. Oats come out even lower, because some of the crop was cut for hay, and the whole acreage is given. Possibly this was the case also with barley. The average for maize was only 10·63 bushels per acre.

RECAPITULATION.

In the annexed table the estimated average yields of such crops as can be compared for most of the countries are given, based on the returns of the respective periods named in the preceding statements. No attempt, as a rule, has been made to estimate the production of beans or peas, because the two are lumped together in all but a few of the returns of foreign countries and British colonies. The yields of turnips and mangolds are too few in number to be placed in the table, as the columns for them would be nearly all blanks. The quantities of hay are those of permanent grass in nearly all cases, no figures being placed in the hay column where the yield is given as that of all kinds of hay.

AVERAGE YIELDS PER ACRE.

COUNTRIES.	Wheat. Bushels.	Barley. Bushels.	Oats. Bushels.	Rye. Bushels.	Potatoes. Tons.	Hay. Cwt.
Great Britain	30·95	33·17	39·06	...	5·75	23·63
United Kingdom	31·14	33·62	40·51	...	4·69	29·59
France	19·57	21·99	26·19	16·34	3·26	28·15
Spain	12·70	18·91	16·24	12·02	...	...
Germany	28·25	32·83	39·69	28·56	5·17	31·99
Austria	17·49	21·83	23·07	19·07	3·59	22·52
Hungary	17·80	21·60	26·60	16·28	3·15	24·14
Belgium	27·43	48·91	54·95	31·70	6·77	30·20
Holland	29·82	46·06	52·85	24·97	5·54	...
Denmark (1901)	28·18	30·92	33·75	23·79	4·00	24·00
Sweden	24·00	24·40	28·98	22·35	3·43	...
Russia in Europe	9·05	11·84	15·67	11·16	2·44	9·91
Poland	14·70	17·13	17·41	12·33	3·24	15·95
Caucasia	10·28	15·69	17·95	0·88	...	...
Siberia, &c.	10·06	13·40	14·43	9·52	...	...
Roumania	15·00	14·64	21·09	13·86	...	16·66
Servia	12·02	13·86	16·58	10·58	2·00	...
Bulgaria	14·00	17·62	19·73	13·22	5·33	...
United States	13·43	25·02	29·15	15·18	...	25·18
Argentina	14·76	...	...	...	...	...
Japan	17·85	26·90	...	...	2·56	...
Algeria	7·88	10·32	26·90	10 47	1·08	...
India	10·63	...	...	...	. .	...
Ontario	18·92	27·40	36 00	16·40	3·08	...
Manitoba	18·45	29·87	38·61	18·31	...	...
N.-W. Canada	19·13	25·27	34 76	...	...	...
New South Wales	9·9	14·61	19·49	...	2·08	...
Victoria	7·18	14 27	20·54	...	3·26	...
South Australia	6·62	14·96	13·52	...	3·44	...
Queensland	15·77	20·70	23·90	...	2·10	...
West Australia	11·51	13·35	17·27	...	2·90	...
Tasmania	19·24	24·29	29·36	...	4·63	...
New Zealand	28·63	31·59	35·81	...	6·26	...
Natal	10·92	5·24	...	...	...	...

SUMMARY.

It will be seen that the yield of wheat in Great Britain or the United Kingdom is higher than that of any other country, while Belgium and Holland alone equal our yield of barley, Germany being in the fourth place, and New Zealand in the fifth. It would be interesting to learn how the estimates are made up in Belgium and Holland; but with respect to the former country, it is to be borne in mind that the crops of only three seasons are covered by the averages, and that these may have been extra productive. In the case of the oat crop, Belgium and Holland come out far above any other country, the averages being so high that they can hardly be credited. Germany is a little ahead of Great Britain, but below the United Kingdom, Manitoba, Ontario, New Zealand, and the Canadian North-West following Great Britain in the order given. For rye Belgium stands first, followed by Germany, Holland, Denmark, and Sweden, while other countries are far below them. Belgium is again at the top for potatoes, New Zealand being second and Great Britain third. Great Britain is beaten by several countries in the production of hay; but among the few which give estimates for roots, there is no approach to the yields of turnips and mangolds in this country.

Nothing is more striking in the table than the meagreness of the yields of wheat in nearly all the exporting countries. Indeed New Zealand, which exports only a trifling quantity, is the only country among them showing fair productiveness. Even where the average is 13 to 20 bushels per acre, selling for export at less than farmers in this country obtain, the gross return is no more than a fair profit on a season's labour on the crop, and yet all expenses have to be paid out of it.

But what, then, is to be said of 6 to 10 bushels per acre? How can it possibly pay to grow such wretched crops to sell at 3s. per bushel on the farm, or at even less money in some years? The gross return of 100 acres yielding 10 bushels per acre would not pay the wages of two men and the expense of keeping a pair of horses in any British colony or in the United States. The truth is that the small farmers, by whom all but a small proportion of the exported wheat is produced, grow it as a crop to provide ready money for clothes and other things, while living mainly off the produce of their farms.

Moreover, great numbers of them get less profit in money off farms of 80 to 160 acres than a farm labourer in their own country obtains in wages. Those who do better have some more remunerative branches of business than that of wheat-growing. During the last two years, however, wheat has been selling better than usual, particularly in the United States, where the farm value per bushel has been 50 per cent higher than it had been on the average in nine out of eleven years ending with 1903, taking the December price as the criterion, as it is taken by the Department of Agriculture.

Barley in most new countries is in only limited demand; otherwise it would be more extensively grown than it is in the United States, Canada, and other countries where its yield is strikingly greater than that of wheat. In the United States, indeed, its percentage increase in area has been greater than that of any other cereal, which is not surprising, seeing that its average farm value for ten years to 1904, as estimated by the Department of Agriculture, is 10·16 dollars per acre, as compared with 8·96 for wheat, 7·94 for oats, and 8·62 for maize. It will be noticed that whereas the yield of oats in the United States is only about 4 bushels per acre more than that of barley, in Canada it is about 9 bushels more. The comparative values of the two crops in the two countries may be judged from this difference.

The choice among the cereals, from a financial point of view, is but a beggarly one; and yet, in spite of all that is said about the desertion of the rural districts for the towns, the attractions of farm life for vast numbers of people are sufficient to induce them to labour on year after year for little or nothing more than a bare subsistence.

CHANGES IN FARM IMPLEMENTS SINCE 1890.

By John Speir, Newton Farm, Glasgow.

When it was suggested that I should write a paper giving an account of the changes in farm implements and machines in the Glasgow Show district, the idea was that reference was to be made only to such changes as had occurred since the Society last visited Glasgow. This seemed too limited a period for a satisfactory survey, and the period was extended so as to embrace the last two Show circuits, or, say, the years that have elapsed since 1890.

Although very conversant with the implements and machines used all over the Show district, I had not the requisite local knowledge of many of the outlying districts to enable me to say what implements and machines were making most progress in each of them. It was therefore decided to send out a list of queries to prominent farmers in each district, with a request that they should give me their opinion on the particular questions asked. Most of those to whom these sheets were sent returned very full replies. The information given has been of the very greatest assistance to me, and for the help thus so freely tendered I beg to express my sincere thanks.

Much of the information given will not be new to many, particularly to those who interest themselves in implements and machines, and more especially to those in the Glasgow district. There are others, however, to whom it may be of considerable assistance in helping them to form some idea of the regard in which certain implements and machines are held by the public, who in the end are the best judges of what is most useful for their particular soil, climate, or crops.

Where new implements or machines are introduced by an agent or maker having a large *clientèle*, a considerable number are sold irrespective of the merits of the article. For that and other reasons several years may come and go before the real merits or defects of certain implements or machines are thoroughly known. It is therefore often indiscreet to express an opinion on any recently introduced machine without having had practical experience of it, as by doing so others may be misled and induced to buy what they should leave alone, and may be prevented from buying what might be of real advantage to them.

The conditions of working in the field vary so much owing to soil, climate, and crops, that ordinary field competitions are very unsatisfactory, and, comparatively speaking, of little value. So much is this the case, that many machines which seem workable enough in the showyard, the showroom, or on the trial plot, utterly fail under the conditions prevalent in ordinary seasons in the field. For this reason the experience of farmers who have used any machine or implement for a number of years is of much greater value as a guide to the worth of the article than any ordinary competition.

For an average machine to be satisfactory, it must not only be able to do its work well, but must not be liable to break down or to cause any damage to the crop. Those of us who are old enough to remember the introduction of the reaping machine know only too well that as long as it went on it did its work fairly well, but the loss and annoyance occasioned by breakdowns almost broke the heart of many a farmer. A well-known relative of my own used to say with regard to the early reaping machine, that in order to keep it going he would require a joiner's shop in the one corner of the field and a smith's shop in the other. Drawbacks regarding reliability or damage often escape notice for a time, but as experience is gained they become too well known.

PLOUGHS.

Notwithstanding the enormous number of ploughs of various patterns which have been introduced during the period under review, the favourite one over a very large area of the Glasgow Show district is still the old iron swing plough. More especially is this the case where the land is clay of a more or less stiff class, and particularly in the higher districts, where the rainfall is usually heavy. For ploughing lea considerable headway has been made in these districts in the introduction of ploughs having chilled reists or mould-boards, of somewhat the same pattern as the swing plough. These ploughs cut a furrow of much the same size as the swing plough; but besides the reist, the sock or wing or feather, as it is variously designated in different districts, is also of chilled metal, instead of the cast-iron reist and malleable iron sock in general use on the swing plough. As far as pattern is concerned, the main and distinctive features of the swing plough are retained, but the materials of which each part is constructed are different. With the exception of the coulter and sock, the other wearing parts of the old swing plough were only renewed at wide intervals. On certain farms and classes of land the side plate and sole shoe might require renewing yearly, but the cast-iron or steel reist often lasted a lifetime, and the handles and body of the plough rarely ever went done. The upkeep of the sock and coulter was, however, exceptionally heavy, and on some of the sharper or harder classes of soils it amounted in a year for smith repairs alone to almost the cost of a modern chilled plough. This was not all, for the time necessary to carry irons to and from the smithy was in some cases an item of considerable importance. In those districts which have adopted the chilled lea plough these outlays have been materially reduced, but with them have gone the pleasant hours of talk and exchange of opinion between ploughmen at the village smithy, to which many of our older men look back with such fond pleasure.

On the lighter soils and more porous clays the broad-shared pattern of chilled plough is almost exclusively used in some districts. For these classes of soils it is eminently adapted: it does its work well, is easy on both horse and man, and easy on the pocket of the farmer, alike in first cost and in annual upkeep. In some districts these ploughs are used exclusively for stubble, red land, or cross ploughing, but in others they are employed for every class of work.

In America, from which the chilled plough, or more properly speaking the concave pattern of reist, was adopted, all ploughs are made with wooden handles, while here our ploughs have for a long time been made with iron handles. English makers of the concave pattern of reist, or as they call it digger ploughs, still use iron handles, while the Americans send all theirs with wooden ones. The bulk of the American ploughs have handles from 4 feet 6 inches to 4 feet 9 inches from the breast to the point of the handle. In this district longer handles are preferred, say 7 feet to 7 feet 6 inches, as was fitted to the swing plough. Either pattern seems to work equally well. The English makers of this class of plough supply only long handles. The ploughs with short handles are not so easily guided along a wet and muddy headland as those with long ones, as the former are difficult to slide on the heel. The consequence is, they are usually turned over on the edge of the wing and tail of the reist. Hauled along in that manner, they are rather sore on the headland, and if it is already dirty they make it very much worse.

There is a popular opinion that short-handled ploughs can be turned on a narrower headland than those with long handles. This, however, is not the case, as it is the length from the heel to the breast of the horses which regulates the width of the headland, and not the length of the handles.

Many of the patterns of chilled ploughs have provision made for replacing the breast, wing, or point, when these become worn, without the necessity of renewing any of the other parts, which may still be quite good enough. This arrangement permits of keeping the plough in good working order at very small expense. Other makers of these ploughs have reversible points and wings, and where these patterns can be successfully used, they still further cheapen the upkeep.

The adoption of the chilled principle of the reist has undoubtedly led to a great saving in horse-flesh, as well as an increase of speed in the work of ploughing. The first recorded tests in this country where the chilled plough is compared with the swing plough, are those of Prof. Jamieson, at Glasterbury, in Aberdeenshire, during the winter of 1884-85. The tests were on lea land, and the depth of furrow 7 inches, each plough taking such a breadth of furrow as it could conveniently turn over. In order to get a steady pull a windlass was used. The swing plough turned a furrow of 10½ inches with a draught of 3¾ cwt., while the chilled plough turned 13 inches with a draught of 2 cwt. Reducing both to the draught per inch of breadth of furrow 7 inches deep, we get the following results:—

Swing plough = 40 lb. per inch breadth of furrow.
Chilled " = 17¼ lb. " "

On land from which a crop of turnips had been removed, and with both ploughs again working at a depth of 7 inches, the draughts were as follows:—

Swing plough with 10½ inch furrow=5 cwt. draught.
Chilled " " 13 " =2 "

Calculated at per inch breadth of furrow, the comparison is as follows:—

Swing plough=72¾ lb. per inch breadth of furrow.
Chilled " =17¼ " "

In another test, where Professor Jamieson used horses instead of the windlass, and where the ploughs were working 8 inches deep on lea land, he gives the results as follows:—

Swing plough with 11 inch furrow=5½ cwt. draught.
Chilled " " 14 " =3¾ "

The above reduced to draught per inch breadth of furrow is as follows:—

Swing plough=65 lb. per inch breadth of furrow.
Chilled " =30 " "

The gain in draught of the chilled plough over the swing plough, as recorded by Professor Jamieson, is much in excess of what farmers generally believed to be the difference between the two.

During the winters of 1887-88-89 I spent a considerable time testing the draught of various patterns of ploughs in many different classes of land. While the chilled plough in every case was much easier to draw than any pattern of swing plough I ever tried, on no occasion had I anything like the wide difference recorded by Professor Jamieson. The following results of a few trials out of a great many may be of some interest to farmers at the present time, and I give them for what they are worth.

On very sticky stubble land (not particularly clayey, but in which the swing ploughs with steel reists could only be kept clear with very great difficulty), working at 8½ inches deep, the results were as under:—

Chilled No. 1[1]=26 to 28 lb. per inch breadth of furrow.
Swing No. 1 =37 to 42 " "
" No. 2 =42 to 46 " "

On light land from which a crop of potatoes had been removed, when ploughing for wheat, and working at a depth of

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[1] The figures refer to the ploughs of the farm, and not to the maker's distinctive numbers.

6½ inches, the draughts of the undernoted ploughs were as follows:—

Chilled No. 1 =23 lb. per inch breadth of furrow.
" No. 2 =28 " "
" turn reist=33 " "
Swing No. 5 =46 " "

On clay land after potatoes, and working 6½ inches deep, the draughts were as follows:—

Chilled No. 1 =30 lb. per inch breadth of furrow.
" No. 2 =38 " "
" turn reist=42 " "
Swing No. 5 =54 " "

On clay land under stubble, the ploughs working 9 inches deep, the draughts were as follows:—

Chilled No. 1=38 to 42 lb. per inch breadth of furrow.
" No. 2=38 to 43 " "
Swing No. 1=46 to 56 " "
" No. 4=46 to 56 " "

On light land, turning a furrow 3 inches deep on clover lea, the draughts were as under:—

Chilled No. 2=12 lb. per inch breadth of furrow.
Swing No. 1=17 " "

All through the trials carried out here the light draught of the chilled ploughs is very noticeable, and in the most of cases in much the same proportion, which, roughly speaking, is that two horses go as easy in the chilled plough at any stated depth and width as three do in the swing one. Although only a few of the trials made here are referred to, each test made on any class of land was repeated several times, and wherever the depths were uniform the draught of the various ploughs bore much the same proportion to each other.

In testing the draught of ploughs a great deal of the accuracy of the results depends on the ploughs being all worked at absolutely the same depth, as even a quarter of an inch up or down makes a corresponding difference in the draught. In the trials here the depth was taken over an average of 3 inches by an apparatus designed on the principle of the parallel ruler, one edge of which rested on the bottom of the furrow, while the other was on the surface. By this arrangement very accurate depths were taken, which were not liable to be affected either by the inequalities of the surface or of the bottom of the furrow.

Even in the hands of a good ploughman, it was invariably found that ploughs (no matter of what pattern) with a wheel under the beam had a more uniform draught than those without. In

Scotland wheeled ploughs, unless of the chilled patterns, have not made the same progress as in England. On hard-bottomed land it is always more difficult to keep any plough at a uniform depth than in softer land, and it is probable that the dampness of the Scottish climate makes us feel little need for a wheel or wheels on our ploughs compared with England, where the soil is drier.

The introduction of the chilled ploughs of America, and the digger ploughs of England, which are designed on much the same principle as the chilled ones, have in great part displaced all other patterns for deep ploughing over the district reported on. We seldom now hear of special swing stubble ploughs, subsoil ploughs, &c., as the recent introductions are able to do anything of either class of work which may be necessary on the average farm.

None of the correspondents refer to the double-furrow plough, so I presume it is making little or no headway in any district, although, judging from its more frequent appearance at shows of late, it seems as if there were districts where some few were being used. In some localities where the soil is light I know that a considerable number of these have been introduced, and are being used chiefly for the ploughing of red land. For this work they seem to be giving satisfaction, as far as they have been tried.

One-way ploughs, and ploughs with seats, have made no headway.

In England the socks or shares of most patterns of ploughs are made of chilled metal, malleable iron or steel being seldom used for that purpose. In districts where it is still considered advantageous to use the swing plough, and where boulders or rocks are not very numerous, chilled socks might be used with considerable benefit. Prior to the introduction of the chilled plough, these were used here for many years with the greatest advantage. The work done was quite satisfactory, and the saving effected was very considerable.

Harrows.

A generation ago nearly all our harrows were wooden-framed, with the tines driven down through the wood. Iron harrows are, however, now in almost universal use, the zigzag pattern being preferred to all others. Judging from the remarks of my correspondents, it seems that in some parishes, more especially in the upland districts, considerable numbers of wooden harrows are still in use; and one correspondent goes the length of saying that they are the best for his neighbourhood.

The spring-toothed patterns, and others which have provision for altering the angle at which the tines are set, seem to be making no headway. There is a general consensus of opinion that there is nothing better at the present time than the zigzag pattern with fixed tines. A considerable number of patterns of bars have been from time to time tried, the favourite at the present time being that of channel iron. None of the numerous patterns which have been introduced for the purpose of fixing the tines, or permitting of easily withdrawing them for sharpening or repairs, &c., seem to meet with so much favour as screwed heads and nuts, as the other methods have never met with any extended sale.

MACHINES FOR SOWING AND PLANTING.

The seeding of grain all over the district is principally done by broadcasting by hand. In some of the counties, particularly in the upland districts, the bulk of the sowing is still done by one hand, but elsewhere both hands are used. Sowing with both hands seems to be very largely on the increase. In Ayrshire, where ryegrass seed is principally grown, a large proportion of it is sown by hand, whereas all over the other counties the farmers use a broadcast machine for sowing it, although they sow the grain by hand. Broadcast grain-sowing machines are making no headway.

Since the introduction of the chilled and digger ploughs there has been a considerable increase in the number of grain-drills. These ploughs leave the land very flat, and on light land particularly it is almost impossible to satisfactorily cover seed-grain, more especially on land which has been ploughed for some time. The use of these ploughs on land where they work to greatest advantage has therefore been necessarily followed in many cases by the adoption of the grain-drill. While in certain districts a few are in use of Scottish or English manufacture, the bulk seem to be of Canadian make. These are lighter in construction than those of British make, and the farmers of this district seem to find them handier than heavier ones for those soils which are free and easy to work.

Within recent years manure-sowing machines have been extensively employed, particularly in the early potato-growing districts along the Firth of Clyde. In these districts, but more especially along the coast from the north to the south of Ayrshire, a double- or triple-furrow drill plough has been in use for a considerable number of years. Since the manure distributor became perfected there has been a strong demand for the combined double-drill and manure-sowing machine. The bodies of two-drill ploughs without beam or handles are mounted on a frame somewhat like that of a three-horse grubber, and above these is placed the hopper of the manure distributor. This machine does excellent work, is praised by everybody who has used it, and for the work which it gets over is not at all costly. Where early potatoes are planted it is in general use, and it may be equally satisfactorily employed where the Maincrop varieties are grown, as well as for putting in the turnip crop. There is only one instance where, as far as I am aware, it cannot be successfully used, and that is where a large quantity of farmyard manure is put in the drill. Where a moderate amount is used, or where the dung has been ploughed in and artificial manures are being applied in the drill, it works to perfection. When used in the early potato districts the drills are only opened by it, the covering up of the sets being done by the ordinary double-reisted plough.

Outside the Glasgow neighbourhood all drilling is, as a rule, done by the double-reisted plough, but there the drills are opened and closed by the single-reisted swing plough. For this purpose the plough has a special reist or mould-board put on, which is specially narrow in front and has the tail raised higher than that of the ordinary plough. This form of reist permits of the drill being made very narrow in the bottom and of the same slope on both sides, so that when the work is completed it is difficult to say which side has been formed by the reist or land side of the plough. Such a plough is more serviceable and does much better work than the ordinary double-reisted plough. It is also much easier to hold than the other, and for clody land it rolls the clods over the drill into the furrow beyond, while it leaves the finest of the earth on the top of the drill. For carrots, turnips, or mangolds this is a great advantage, as it conduces very materially towards getting a good braird. On the other hand, the double-reisted plough shoves all the clods into the centre of the drill, and in a dry season (like that of 1905), when it is difficult to get a plant even with the best of management, many of the blanks which occur are no doubt traceable to the plough which has been used. Notwithstanding these and other advantages, the use of the single-reisted plough has not increased much, and what increase has taken place has occurred principally on the larger farms.

Within the last year or two a few farmyard manure-spreaders have been introduced into the Show district. These have hitherto been used for spreading the manure solely on the flat, principally on land under timothy. As far as is known, none of these have been used for putting the manure into the drills, nor have special spreaders been yet used for that purpose.

Potato-planters have not made much headway in any part of the district, an odd one here and there being all that are in use. Owing to the gain which is found to result from the sprouting of Maincrop varieties prior to planting, the probability is that the potato-planter may never now come into very general use, because as it is at present constructed it is incapable of dealing with sprouted seed.

Although a box can scarcely be called an implement or a machine, it may not be out of place to refer here to the important part now played by it in the growth of potatoes. The keeping of potatoes intended for seed in boxes during winter has made great progress during the last few years. At first only early varieties were so treated, principally for the purpose of hastening growth in order to get them ready for market as soon as possible. But the process was found to have other advantages besides earliness, as a crop the seed of which was so treated was found, if allowed to mature, to give a heavier yield than where the seed had received no such preparation. By degrees Maincrop varieties came to be treated in the same way, and now large breadths of them are planted from boxes. With the early varieties the seed is put in the boxes any time from July forward, whereas the Maincrop varieties need not necessarily be boxed till between November and January. Maincrop varieties are only put in the boxes in order to keep the seed in good condition, and not to make them earlier, as such in many districts would render the crop liable to damage from frost.

In 1901 trials were made by the Highland and Agricultural Society at eight centres with late varieties of potatoes so treated. The results, which are reported in the 'Transactions' of 1902, showed on the average a gain of 10¾ cwt. per acre in favour of boxed seed. In 1903 the Department of Agriculture for Ireland carried out a similar experiment at twelve centres in various counties, the average gain of which from sprouted over unsprouted seed was 33 cwt. of potatoes per acre. The same experiment was repeated on a larger scale in 1904, when it was tried at thirty-four different centres, the average gain of that year being 53 cwt. per acre. Such increases cannot be expected to be obtained every season and on every class of land, but sufficient information has already been obtained to warrant a general increase of the practice.

CULTIVATING APPLIANCES.

At the beginning of the period under review, the Planet Jr. Co. of America introduced a drill cultivator which, while light and cheap, seemed to be able to do much of the work of a drill grubber. Its principal peculiarity was that the tines were fitted with reversible points of such a design that they remained moderately sharp no matter how much worn, and when useless could easily be replaced at a very moderate cost. The points are made of hard yet tough steel, about ¼ inch thick and 6 inches long. Each point is slightly curved both lengthwise and crossways, so that it partakes somewhat of the form of a tube which had been split into six or eight pieces, each of which is slightly bent at the middle, through which there is a hole for inserting a bolt to fix it to the tine. Notwithstanding the lightness of the cultivator or the amount of wearing to which the points may be subjected, they still remain sufficiently sharp to penetrate any ordinary land. When one end of the point has been worn so much that the tine comes in contact with the soil, the bolt is slackened and the point turned upside down, when it is again ready for work as soon as the bolt is tightened.

The introduction of this principle of cultivator-points was a great advance on our previous method of welding a piece of steel or iron on the point of the grubber tine. There was always a difficulty in so setting these that they penetrated the ground uniformly, and to an equal depth. After a little use in hard or wearing land, the old grubber tines invariably became thick at the point, and rarely penetrated the ground to the extent they were intended to do. The reversible points are now made with two bolts instead of one, which keep them better in position than when one alone was used. Some of the more important principles of this cultivator were at once adopted by several British makers, so that at the present time various modifications are in use all over the district.

About the same time as the introduction of the drill cultivator referred to above, the Massey-Harris Co. of Canada introduced a wide one of the spring-toothed pattern. It has a pole, is carried on two light wooden wheels, and has a lever for lifting the tines out of the soil or applying pressure to them when in the ground. This cultivator is so constructed that besides the movement which each tine has owing to the spring, it is so designed that every four tines or so may rise independently of the others. This arrangement permits of much greater movement among the tines than in any harrow or cultivator hitherto in use. For rough land it may be used either as a harrow or as a cultivator, and cannot be excelled for shaking weeds out of land previously broken up by any heavy cultivator. For a number of years it had a rapid sale, but owing to the difficulty of getting it to penetrate land which was at all solid, sales during recent years have greatly fallen off.

A few years ago the Planet Jr. Co. of America introduced a cultivator on a rigid frame, which was designed to work either on the flat or in drills. It is provided with a pole, wheels, pressure lever, reversible points, and has provision made for widening or closing the spaces between the tines. While the tines are fixed on a rigid frame, the frame itself is held in position by a powerful spring, so that in the event of any tine catching a boulder the spring usually yields and allows the frame to rise before a breakage occurs. This implement is capable of performing so many different operations, and of doing each in such a satisfactory manner, that it at once made headway all over the country. The cross-bar on the front of the pole is made wider than that of a reaper or mower, and when the tines are spaced to suit, it efficiently cultivates three drills of potatoes, turnips, or cabbages at a time. The lengthened cross-bar permits of the horses walking with a drill between them, and in turning at the ends provision is made for lifting the tines clear of the crop by the pulling of a lever.

Points of different breadths, according to the class of work to be done, can be put on the tines. Light double mould-boards or reists are also provided for fitting on to the tines, so that with two horses three drills of turnips or potatoes may be lightly earthed up at one operation. Some people use it also for opening turnip or potato drills, only two drills being opened at a time, the third reist being used as a guide for width, as it follows up the last-opened drill.

Several cultivators of British manufacture are now made, in which the principle of easing any unusual strain on the tines by one or more springs is adopted. Of these Martin's seems to have made greatest headway in the district. It is highly spoken of by several correspondents, who use it only as a cultivator.

THE HARVESTING OF HAY AND GRAIN.

During recent years there has been no new developments in mowing machines, and all over the counties reported on there is scarcely any maker but who has some district in which his machine is the favourite one. While there has been very little change in the mowers during the period to which these remarks apply, there has been a very great change in the machinery used in securing the crop. When horse-rakes first became common, few were fitted with a seat for the driver, or had provision made for operating the rake from the driver's seat. The method then was for the person working the rake to walk behind, in doing which he had to step over every row of hay, which was needless and laborious work. Now all hay-rakes are provided with seats, and the bulk of those purchased during recent years are self-acting, or at least only require to be put into gear by the foot of the driver, when the rake releases its load.

Horse-rakes of American manufacture are anything but favourites in this district, and those who have them speak most unfavourably of them. The same complaint is made with regard to all makes—viz., that the tines are far too weak and pliant for dealing with such crops as are grown in the west of Scotland. Users say they work quite satisfactorily when handling a very light crop, or in clearing the land when ricking. A large proportion of the hay grown in the Glasgow Show district is timothy, the produce of which is from two to four tons per acre. With such a crop the tines of the American rake get quite straightened out, and slip over the crop without collecting it.

In the 'Transactions' of this Society for 1904 a description and illustrations are given of a hay collector which had been introduced from America, and had been in use on this farm for some time. That collector was for the purpose of bringing hay to those building the ricks, for which purpose it was found of great advantage. The usual practice is to bring the hay to where the rick is being built on hay sledges; but occasionally it is done by a rope pulled by a horse, while at other times the hay is brought together by forks. The collector is drawn by two horses and worked by one man, who can bring in sufficient hay from quiles, or rows of hay shaken out from the quile, or from swaths, to keep from three to four men building, according to the weight of crop. As yet the number of these hay collectors in use is limited, but they are gradually on the increase.

The greatest increase in hay-making machinery has been in rick-lifters and horse-forks, each of which is of little use without the other. Prior to 1886 the horse-fork was in limited use in South Wales, while the rick-lifter had been tried to a trifling extent in the Strathaven district of Lanarkshire. Neither machine seemed to me, in the circumstances in which it was placed, to be afforded the opportunity of doing anything like the effective work it was capable of if the two were worked in combination —and at that time neither were making any headway. Early in the summer of 1886 I bought a horse-fork and two rick-lifters, and the combination was found so useful and effective that a second set was ordered by a neighbour within a few days after the first had been at work. Each season a few more sets were put in operation, but it was not till after 1890 that they came into anything like general use. Since then, however, the increase has been phenomenal; and wherever hay is grown extensively in the Glasgow Show district, either for sale or home consumption, rick-lifters and horse-forks are largely employed. The saving effected in heavy labour has been very great, while the capital outlay has not been excessive.

At first the ricks were in every case pulled on the rick-lifter by a hand windlass, but now a horse is usually employed for pulling them on. Sheds for storing hay are now common adjuncts to most dairy farms, and many of these are now fitted up with horse-forks.

Combined reapers and binders have been steadily on the increase in recent years, but there has been no radical improvement made on any of them. The bulk of those in use are still of Canadian or American manufacture, although Scottish and English makers have a few in the district. Owing to the damp climate of the south-west, the wear and tear of canvases is much heavier than in drier districts; and in other respects they are a serious source of annoyance. Farmers have persistently asked for some substitute which would be an improvement on them, but as yet none much if any better than the canvases has been introduced. In dry weather, and with dry crops, canvases are neither costly to keep up nor do they cause much trouble; but with damp weather and heavy crops they are anything but satisfactory. Belts covered with laths have been tried in sufficient number to thoroughly test their efficiency; but while some users speak highly of them, others think they are no improvement on the canvases, and any headway they are making seems very trifling.

MACHINES FOR SECURING THE TURNIP AND POTATO CROP.

Many attempts have been made to improve on the existing methods of securing these crops, but none of them have met with public favour. Turnips are everywhere topped and tailed by the hand-knife. In the early potato-growing districts, and on farms where only a small area of the Maincrop varieties are grown, the potato graip or fork is the only implement in general use. Where Maincrop varieties are extensively grown, the crop is almost universally raised by the potato-digging machine. Within the period under review these have generally been made with a pole, whereas previously such was seldom the case. Details have been improved on by most makers, but otherwise the machine is little changed since 1890. The bulk of the machines in use in the district are of local make.

Every now and again machines have been introduced for the dressing of potatoes, but the potato-riddle is preferred by most growers to any of the larger and more complicated machines.

THRASHING AND BARN MACHINERY.

Over a very large area of the Glasgow Show district most of the straw which is grown is used for fodder. Straw which is newly thrashed is usually more palatable than that which has been thrashed for some time, and in consequence there is a thrashing-machine on most farms, of from two to four horse-power in size. About twenty years ago there was a tendency not to replace these where worn out or when the occupancy of a farm changed hands, but to use the travelling thrashing-machine instead. For the last few years the tendency is now the other way, and small thrashing-machines are being erected more freely than formerly. Various causes have contributed to this, but the most important are probably the increased palatability of the fodder and the introduction of the oil-engine.

In grain-dressing machines there have been no alterations of any importance for a considerable number of years.

FOOD-PREPARING MACHINES.

Grain grinding and bruising machines seem to be largely on the increase, principally caused by the adulteration which is known to be so largely practised in the sale of bean-meal, and the introduction of the oil-engine. Many farmers now grind all their own feeding-stuffs, not that they think they can do it any cheaper than can be done at a public mill, but because when they do so they know what it contains.

A much larger proportion than formerly of grain intended for the food of horses is now bruised or broken. Oats are crushed, maize and beans broken, and hay cut, the whole being mixed in the desired proportions before being fed to the animals. When the food is so prepared, horses are found to be fed cheaper, kept healthier, and are more able for their work than when no preparation is given to these articles. At one time nearly all farm horses received twice a-day a pailful of boiled food, composed of cut hay, roots, and meal, or beans and grain. This practice is now rapidly on the decrease, although still very common in some districts.

The slicing or pulping of roots for cattle does not seem to be much on the increase; steaming or boiling of food for them appears rather to be on the decrease.

POWER ON THE FARM.

Where water-power is available and sufficient, most farmers think there is no source of power equal to it for driving fixed machinery. In many cases, however, the cost of providing storage for water to supply power during periods of drought is so great, or the supply is so intermittent without it, that in the end it is often costly and unsatisfactory. At the present time there is a greater demand for power to drive fixed machines than ever before on farms, but we seldom now hear of that power being water. The days of the steam-engine as a source of farm power seem also to be on the wane, as it is only at wide intervals that a new steam-engine is put in on any farm.

The very successful trial of oil-engines carried out by the Society in the showyard at Edinburgh in 1899 gave a great impetus to these as a source of power on farms where steam did not previously exist, and where water was not available. Since then the demand has continuously increased, and has had a considerable effect on the greater demand for thrashing, grinding, and other machines on farms.

The late trial by the Society in the showyard at Glasgow of engines driven by gas produced on the spot by what is known as the suction process, seems to indicate that in these we probably have the cheapest source of power yet introduced.[1] As far as has been learned, no installations of suction gas producers have yet been erected on any farm, but numerous inquiries have been made by persons in want of a new source of power, and it is expected that their successful introduction on farms is only a matter of time.

Wind as a source of farm power has made considerable progress during the last fifteen years, more especially for water-pumping. For heavier or more intermittent work it has not been in so much demand as one would have expected. In a breezy district like what the bulk of the Glasgow Show district is, this is a power which might have been taken more advantage of in the past.

Electricity as a source of motive power is beginning to be used in districts where current is available. As yet the number of motors in use is small, but several have them under consideration. Where this power is obtainable at a moderate price, no other is so clean or so handy, where, as is always the case on farms, its use is intermittent and the amount wanted is small.

Dairy Machinery.

In 1896 the Highland and Agricultural Society offered a prize of £50 for the best milking machine, the trial to take place in connection with the Show to be held in Glasgow on the following summer. There were several machines entered for competition, and at that time it seemed as if the use of these would go on increasing. Such, however, has not been the case, as the disappointment which has resulted from the use of this machine has been greater than from probably any other agricultural appliance tried in recent times. Some of those erected about 1897 are still at work, and are said to be giving satisfaction; but until quite recently few have been installed for several years. Within the last year a considerable number of a new design have been erected, mostly in the Glasgow district. They are said to be giving satisfactory results, but with the exception of one or two, the time they have been in use is too limited to permit of the owners expressing any very reliable opinion about them.

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[1] See Report on the Glasgow Highland Show in this vol.

Since the Board of Agriculture fixed the standard of fat which should be in milk exposed for public sale, there has been a demand for small butter-fat testers greater than previously existed. Those in greatest demand are of the Gerber design, which during recent years seems to have supplanted all others.

MISCELLANEOUS.

As in many other localities, charlock is very plentiful in the south-west of Scotland. Spraying machines for destroying it, by the application of a solution of sulphate of copper, have been in considerable demand for the last year or two. Few of these are, however, purchased by farmers, as it is only on the very largest farms that the outlay is warranted. For ordinary use farmers prefer to hire them, and in several parts of the district machines can be hired for this purpose.

The use of these machines for spraying potatoes, in order to ward off the potato disease, has not been so successful as that for the destruction of charlock, although here and there an odd machine has been purchased for that purpose.

CAPITAL INVESTED IN MACHINERY.

My correspondents are almost unanimous in the opinion that the outlay now necessary for implements and machines for the average farm is largely on the increase, but most of them find it difficult to say what the increase amounts to since 1890. According to the class of farm, they put the capital necessary to provide machinery at from £1 to £3 per acre.

DAIRY INVESTIGATIONS IN THE NORTH-EAST OF ENGLAND.

By DOUGLAS A. GILCHRIST, Professor of Agriculture, and C. BRYNER JONES, Lecturer in Agriculture, Armstrong College, Newcastle-upon-Tyne.

THE Agricultural Department of Armstrong College, Newcastle-upon-Tyne, has been engaged in an inquiry into the variations in the composition of milk since the beginning of 1903. The first tests were made at the request of the Northumberland and Durham Dairy Farmers' Association, and these were elaborated at the instigation of the Northumberland County Council, which desired that some reliable information on the subject should be placed before the dairy farmers of that county.

It was soon felt, however, to be desirable that dairy research work of a more permanent character should be carried out; and, as the Northumberland station at Cockle Park is mainly engaged in experimental work connected with farm crops and the rearing and feeding of live stock, the authorities of Armstrong College submitted a scheme for experiments in dairy work to the Durham County Council. This scheme was accepted by the County Council, and as a result the work is now being carried out at Offerton Hall, about three miles from Sunderland. This farm is about 580 acres in extent, 165 acres of which are pasture, and there is a herd of fifty dairy cows. Arrangements have been made with Mr James McLaren, the tenant of the farm, by which the College authorities may at any time select ten cows for an experiment and place them in a separate cow-house, while experiments in calf-rearing may also be undertaken. A laboratory and a weighbridge have also been provided.

Mr James McLaren, junior, a former student of the Agricultural Department, supervises the experiments, such as weighing out the rations, the feeding and weighing of the cows, and personally does the whole of the milk-testing. The College was fortunate in securing the ready co-operation of Mr McLaren, on whose farm much of the previous work had been done, and in securing also a local supervisor in Mr McLaren, junior, to both of whom much of the success which has, so far, attended the experiments is due.

For the present, attention has to be confined to the experiments described below; it is hoped that other experiments at Offerton will be reported upon in the next volume.

VARIATIONS IN THE COMPOSITION OF MILK AND THEIR PROBABLE CAUSES.

A large number of samples of milk of individual cows and of mixed milk have been collected from different farms, and the amounts of butter-fat and of solids-not-fat contained therein have been estimated. The breed of the cows, the times of milking, the weather conditions, the temperature outside and inside the cow-sheds, and the daily rations fed to the cows, have all been noted. Mr James McLaren, Offerton Hall, and Mr Charles Marshall, Broomhaugh, both placed their herds at the disposal of the College, and samples of milk from individual cows and from the mixed milk of these herds have been taken fortnightly and tested at the College. Samples have also been taken and tested from cows on the Duke of Northumberland's Home Farm, Alnwick, and from the herd of Mr J. Swan, Lookout Farm, Seaton Delaval. As changes in the composition of milk of individual cows occur very quickly, the milk of one cow has been regularly tested at Cockle Park during the greater part of 1903, so that their extent might be noted.

Sampling and Testing.

Every care was taken that all the first drawn milk and all the strippings were included in the bulk from which the sample was taken. Each lot of milk was thoroughly mixed before the sample was taken, and this was taken from the middle of the bulk.

Offerton Results, 1903.

At Offerton, the milk of each of twelve Shorthorn cows was tested once a fortnight. They were milked three times a day, at 5 A.M., 1 P.M., and 6 P.M. The amount of milk given by each cow averaged about 11½ pints in the morning, 7 pints at midday, and 4 pints in the evening, or about 2¾ gallons per cow daily. The milk is all retailed in the Sunderland district. Each cow received daily 100 lb. roots, 8 lb. hay, 10 lb. cake and meal, and as much oat straw as she would eat. They were either not turned out at all, or for about half an hour only.

Two hundred and sixteen tests were made of the milk of the individual cows, with the following results: Morning's milk, 72 tests—15 tests under standard of 3 per cent fat, 1 test under standard of 8·5 per cent solids-not-fat; noon's milk, 72 tests—no test under standard of 3 per cent fat, no test under standard of 8·5 per cent solids-not-fat; evening's milk, 72 tests—6 tests under standard of 3 per cent fat, no test under standard of 8·5 per cent solids-not-fat. Increase in quantity did not usually mean a falling off in quality, nor *vice versâ*. In the case of the mixed milk, the largest quantity of morning milk produced (January 24) was also the richest in fat, while the smallest quantity of noon milk (March 7) was poorest in fat.

OFFERTON DAIRY HERD.—COMPOSITION OF MIXED MILK OF TWELVE COWS (calculated).

Date.	Fat			Solids-not-fat.			Pints.			Weather conditions.
	M.	N.	E	M.	N	E	M.	N.	E	
1903. Jan. 10	3·03	4·03	4·02	9·36	9·17	9·43	135	85	18	Mild, wet, sleet later, strong N. wind.
" 24	3·62	4·46	4·53	8·76	9·03	9·26	148	87	37	Fine day, mild previous evening.
Feb. 7	3·33	4·31	4·39	8·82	8·83	9·13	143	87	16	Fine morning, wind and gale later.
" 21	3·30	4·22	4·21	8·91	9·07	9·11	135	80	12	Windy, fair morning, rain later.
Mar. 7	3·60	4·21	3·89	8·97	9·05	9·28	133	61	10	Fine after frosty night.
" 21	3·32	4·30	3·95	8·84	8·88	9·06	136	70	17	Mild and windy.
Average	**3·36**	**4·26**	**4·16**	**8·91**	**9·00**	**9·21**	**138**	**79**	**43**	

Broomhaugh Results.

Here the milk of each of twelve shorthorn cows (selected from a herd of thirty-six cows) was tested fortnightly throughout the year 1903, the times of milking being from 5.30 to 6.30 A.M., and from 4 to 5 P.M.

The mixed milk was under the standard of fat once only—viz., on the morning of September 24, when the fat percentage was 2·8. The solids-not-fat were five times just under the standard in the evening, being only so in July and August; and once in November they were as low as 8·2 per cent in the morning milk. The effects of indoor and pasture feeding were as follow:—Average fat in milk: winter feeding indoors (12 tests), morning, 3·7 per cent; evening, 4·0 per cent—pasture feeding outdoors (9 tests), morning, 3·4 per cent; evening, 4·1 per cent. It should be stated that the cows each received from 5 to 8 lb. concentrated food daily while they were on pasture.

The quantity of milk given on the average by each cow was: during winter—morning, 10 pints; evening, 8¾ pints: during summer—morning, 9¼ pints; evening, 8½ pints.

BROOMHAUGH DAIRY HERD.—COMPOSITION OF MIXED MILK OF TWELVE COWS (calculated).

Date.	Fat.		Solids-not-fat.		Pints.		Outside temperature.		Time out of doors.	Daily ration.*	Weather conditions.
	E.	M.	E.	M.	E.	M.	12 hours previous to E	12 hours previous to M			
1903.											
Jan. 11	4·3	3·7	8·8	9·1	9	9½	21	22	Half an hour for water	10 lb. cake and meal, 21 lb. swedes, 17 lb. hay	N.E. breeze.
" 28	3·8	3·8	8·7	8·7	8	9½	14	38	" "	" " "	Fine, mild.
Feb. 12	3·8	3·7	8·6	8·8	8	9	..	51	" "	" " "	W. wind, fair.
" 26	3·8	3·6	8·87	9·0	8	10½	38	38	" "	" " "	" "
Mar. 12	4·0	3·8	8·7	9·0	10	11½	36	42	" "	" " "	Fair, very little wind.
" 26	4·5	3·9	8·5	8·8	7	9	45	52	" "	" " "	Mild, S.W. wind.
April ..	...	...	...	.	..	..	..		..	...	
" 23	4·3	3·4	8·7	8·8	9¾	11	31	40	2 hours . .	10 lb. cake and meal, 21 lb. swedes, 17 lb. hay	Fine warm day, N. wind.
May 7	3·8	4·3	8·9	8·8	11¼	13¼	...	49	8 hours; on grass	11¼ lb. cake and meal, 20 lb. mangels, 7 lb. hay, and pasture	N. wind.
" 21	3·7	3·8	8·8	8·7	11½	12½	34	55	10 " "	" " "	Gentle breeze from S.W.
June 4	4·0	3·5	8·8	8·7	11¾	11½	..	57	All day and night	Pasture, and 8 lb. cake and meal . .	Calm.
" 18	3·5	3·6	8·7	8·7	9¾	10¼	47	49	" "	Pasture, 5 lb. cake and meal, cut grass and clover	Slight W. breeze, with rain.
July 9	4·4	3·3	8·4	8·6	9½	9½	..	65	" "	" " "	Wind N.W. as a whole, but very changeable.
" 23	3·7	3·5	8·49	8·6	8	8¾	56	66	" "	Pasture, 6 lb. cake and meal, cut grass and clover	Calm.
Aug. 6	4·5	3·6	8·4	8·6	8½	8½		63	" "	Pasture, 8 lb. cake and meal, new hay .	Strong W. wind, showery.
" 28	4·6	3·6	8·49	8·5	8	8¾	52	64	" "	" " cut clover .	Mild, with showers.
Sept. 10	4·3	3·6	8·6	8·8	8¼	9		51	" "	" " "	Cold N.W. wind, very humid.
" 24	4·0	2·8	8·5	8·6	7¼	8½	43	68	" "	" " "	Dull, close day.
Oct. 8	4·1	3·7	8·4	8·5	7½	8	...	52	" "	" " "	W. wind, with rain.
" 22	4·6	3·3	8·5	8·7	8½	8½	..	48	8 hours, in at night .	" " "	" "
Nov. 5	4·0	3·5	8·6	8·2	7¼	8	43	46	8 " "	Pasture, 8 lb. cake and meal, cut clover, turnip tops	" fine.
" 19	4·0	3·7	8·9	9·1	7	9	..	34	6 " "	28 lb. white turnips, 6 lb. hay, 6 lb. cake and meal	Fine and cold.
Dec. 3	4·1	4·2	9·1	8·8	6¾	9	.	29	5 " "	28 lb. swedes, 12 lb. hay, 6 lb. cake and meal	" "
" 17	4·4	3·6	9·2	9·3	6¼	7¾	32	37	5 " "	" " "	Dull and close, with rain.

* In addition to straw *ad lib.* Heavy milkers got in addition a mash made of 7 lb. of a mixture of oat-dust, decorticated cotton-cake meal, and maize meal.

The milk of the individual cows again showed great variation here. Five hundred and four tests were made, with the following results: Morning milk, 252 tests—40 tests under standard of 3 per cent fat, 46 tests under standard of 8·5 per cent of solids-not-fat; evening milk, 252 tests—17 tests under standard of 3 per cent fat, 62 tests under standard of 8·5 per cent of solids-not-fat. Here also increased quantity did not usually mean a falling off in quality. Some striking variations occur in the milk of the cows at Broomhaugh that are evidently due to the individual characteristics of the cows themselves. The yield and amount of fat in the milk of a cow called "Fidget" was extremely variable,—this cow being quick-tempered and very excitable. Two cows, called "Slaggy" and "Ruth," were of quiet and peaceful dispositions, and the milk of these cows was very even, both in quality and quantity. Another cow, "White Rose," was quiet, but she allowed her milk to run from the udder, and in this case the amount of fat was variable.

Results at Seaton Delaval.

The mixed milk of six shorthorn cows was tested daily from March 4 till May 12, 1903. They were milked at 6 A.M. and 4.30 P.M.

The individual milk, as well as the mixed milk, of six to eight cows was tested once every fortnight, from March 5 till June 18, 1903. The solids-not-fat were in eighteen instances under the 8·5 per cent standard out of 128 tests of the milk of the individual cows. They were always above the standard in March and April. At no time did the fat or solids-not-fat fall below the standard in the mixed milk. Two cows of a nervous temperament gave milk in which the fat varied considerably. Frequently when the cows gave more milk it had more fat, and when they gave less milk it had less fat.

During the seventy days' tests neither the solids-not-fat nor the butter-fat were at any time below the standard. The average yield of each cow was 1⅙ gallon in the morning, and nearly 1 gallon in the afternoon; while the fat averaged 3·55 per cent in the morning and 4·09 per cent in the afternoon.

Weather effects.—A strong west breeze was blowing from March 4th till 6th, but this moderated on the 7th, and the fat of the milk increased 1·1 per cent that afternoon over that of the previous afternoon. The cows had been out about five hours on each of these days. On April 5th and 8th there were comparative calms after wind, and on each of these days the afternoon's milk had ·5 per cent more butter-fat. On April

11th a strong north-west breeze was blowing, and the fat went down by ·3 per cent. A cold north wind continued till April 18th, accompanied by a considerable drop in the fat of the afternoon's milk on many of the intervening days. On April 19th a calm day followed, and the fat increased. The fluctuations in percentage of fat were greatest during the cold weather, with north winds, between April 11th and 25th. Wet weather with no wind followed till May 6th, during which time the afternoon's milk had more fat and less variation in amount. The cows were usually turned out five to six hours a day from March 4th till May 8th. They were turned out for about half that time on April 12th to 15th, and on May 2nd, 3rd, and 6th. On five of these seven days the afternoon's milk had an increased amount of butter-fat, and this may have been prevented by the severe weather of the remaining two days. On May 22nd the evening's milk was 1 per cent richer in fat than that of the morning, this being a warm day after a cold night. Apparently the cold night reduced the fat percentage of the morning's milk, but the warm day which followed considerably increased it. On June 18th, when it was fine after a cold wet night, there was 1·2 per cent more fat in the evening's than in the morning's milk—a similar result to what had taken place on May 22nd. On April 9th a strong wind was blowing when the cows were out during the day, which may be the cause of the evening's milk being no richer on that day than that of the morning. On June 4th the weather was warm, and the evening's milk was slightly richer in fat than that of the morning. The cold wet night of June 17th affected the milk of cow No. 1, by greatly reducing the quantity of her morning's milk, while the fat percentage in the milk of cow No. 8 was reduced very largely on the same morning.

Change of food.—The cows were turned out at night on and after May 9th, and their milk was tested till May 12th. The weather was fine and the evenings were mild. They received grass only after being turned out. Notwithstanding this complete change of conditions there were practically no changes in the quantity or quality of the milk. From March 4th till 10th each cow received daily 86 lb. mangels, 20 lb. hay, and 10 lb. linseed cake. On March 11th a compound cake replaced the linseed cake, with no change in the quantity or quality of the milk. On March 24th, 6 lb. of another compound cake with 4 lb. of maize and oatmeal were given, and still there was no change in the milk. The quantity of mangels given was reduced to 50 lb. per cow daily on April 23rd, but the quantity and quality of the milk produced by the cows were not reduced thereby. Nor was this so when the mangels were withdrawn altogether on April 30th. When the mangels were stopped the cows would have remained out all day if the weather had been fair, but as wet weather followed they were out only for the same time as before.

Alnwick Results.

The mixed milk of three shorthorn cows was tested daily from March 19 till April 20, 1903. They were milked at 6 A.M. and 6 P.M. The fat in the morning milk varied from 2·15 to 4·25 per cent, and in the evening from 2 45 to 4·35 per cent.

These cows gave milk poor in fat after strong winds on March 28 and 29, as well as on April 2 after heavy winds.

On seven of ten days that the wind changed to the north the evening mixed milk was poorer than that of the morning, the reverse being the normal condition.

At other times also severe or windy weather considerably reduced the amount of fat in the milk.

Cockle Park Results.

Regular tests of one cow's milk were made daily for the first nine months of 1903. These showed that the milk of one cow is subject to great variations, especially in percentage of fat, after cold nights in June. The morning milk was usually much poorer than that of the evening, but during fine days in July the reverse was usually the case. When the cow was out on an exceptionally cold and wet evening in September the morning milk was very poor. When also she was in season on June 10 the milk on the following morning was very poor in fat, although not reduced in quantity.

Offerton Results, 1904-5.

The variations in the quality of the milk at different times of milking is shown in the table on page 70. In all cases the figures above the line give the fat percentage, and those under the line the quantity of milk (in pints). All the figures are averages of five cows, and the daily averages for periods of twelve weeks.

The figures in table (p. 70) are extracted from the Offerton feeding results. They show that much the largest quantity of milk is given after the longest interval (11 hours), and that this is also considerably the poorest in butter-fat. The noon milk is on the average the richest in fat of the three milkings, although the preceding interval is two hours longer (7½ hours) than the interval before the evening milking (5½ hours). The quantities of milk, however, practically correspond with the length of the intervals before each milking.

The same cows were under experiment from February 10 to August 24, and it will be seen that their milk did not contain less butter-fat during the second period while they were on pasture than in the first period while they were indoors. All these cows were well fed throughout, and yet the five cows of Lot II. gave morning milk with an average of only 2·57 per cent of fat from February 10 till May 3, and the weekly tests showed that their morning milk was always under the standard throughout the twelve weeks. As these cows were each receiving 12 lb. concentrated food daily, there is here clear evidence that rich feeding will not materially improve the quality of the milk, and a direct answer to those analysts and others who occasionally advise dairy farmers to feed their cows better so as to improve the quality of their milk.

OFFERTON RESULTS, 1904-5.

		Cake and meal per cow daily.	Times of milking			Daily average.
			5 A.M.	12.30 P.M.	6 P.M.	
Feb. 10–May 3, 1904—		lb.				
Cows indoors	Lot I.	8	2·97	3·94	3·90	3·48
			43·12	29·04	22·46	94·62
	Lot II.	12	2·57	3·69	3·63	3·16
			51·16	33·46	27·69	112·31
June 2–Aug. 24, 1904—						
Same cows on pasture	Lot I.	8	3·23	3·83	3·70	3·51
			48·52	29·55	25·06	103·14
	Lot II.	4	3·03	3·75	3·68	3·40
			47·94	30·14	26·83	104·92
Nov. 1, 1904–Jan. 23, 1905—						
Fresh cows indoors	Lot I.	8	2·88	3·59	3·70	3·28
			56·75	34·41	28·16	119·33
	Lot II.	12	2·95	3·82	3·45	3·31
			63·08	37·87	31·18	132·16
Feb. 1–April 25, 1905—						
Same cows indoors	Lot I.	12	3·15	3·85	3·80	3·50
			51·41	32·37	25·20	109·00
	Lot II.	8	3·13	3·97	3·45	3·44
			53·79	32·95	27·20	113·95
Averages . . .			2·99	3·80	3·68	3·38
			51·97	32·22	26·72	111·30

Equal versus Unequal Intervals between Milking at Offerton.

Two lots of cows, five in each lot, were fed from May 7 to 24 (18 days) on exactly the same food. The cows of Lot I. were milked at 6 A.M. and 4 P.M., those of Lot II. at 6 A.M. and 6 P.M.

EFFECTS OF EQUAL AND UNEQUAL INTERVALS BETWEEN MILKING.

Date.	Lot I. Milked 6 A.M. and 4 P.M.						Lot II. Milked 6 A.M. and 6 P.M.					
	Morning.			Evening.			Morning.			Evening.		
	Milk in pints.	Fat %	Solids-not-fat %	Milk in pints.	Fat %	Solids-not-fat %	Milk in pints.	Fat %	Solids-not-fat %	Milk in pints.	Fat %	Solids-not-fat %
May 7	51	3·4	8·9	40½	4·0	8·8	47½	3·6	9·0	50	3·5	8·6
" 8	48	3·5	8·9	41	3·8	8·8	45½	4·0	8·7	51	3·5	8·6
" 9	50	3·5	8·6	42	3·8	8·8	45	4·1	8·8	52	3·6	8·9
" 10	51	3·8	8·5	39½	3·8	8·7	44½	4·0	8·6	50	3·5	8·7
" 11	51½	3·7	8·7	39	4·0	8·8	44	4·1	8·6	51	3·8	8·6
" 12	49	3·5	8·9	39½	3·9	8·8	46	3·9	8·7	53½	3·5	8·8
" 13	51½	3·8	9·0	36½	3·6	8·6	46½	4·1	8·7	49½	3·4	8·7
" 14	54	3·6	9·0	41½	3·9	8·5	49½	4·0	8·8	50	3·5	8·6
" 15	45½	3·8	8·9	41½	3·9	8·8	48	4·0	8·8	51	3·8	8·7
" 16	48½	3·6	8·5	39	4·1	9·1	47½	4·0	8·8	49½	3·9	9·0
" 17	49	3·9	8·6	41½	4·1	8·9	48	4·1	8·6	55½	3·7	8·8
" 18	52½	3·6	8·8	41	4·0	9·1	52	4·1	8·6	52½	3·8	8·7
" 19	52	3·7	8·5	41½	3·9	8·8	49	4·0	8·6	53	3·8	8·6
" 20	55	3·6	8·7	39	4·0	8·9	53	4·1	8·9	52½	3·8	8·9
" 21	55½	3·7	8·9	40½	1·1	8·9	55	4·1	8·9	53½	3·7	8·6
" 22	52	3·7	8·7	41	4·0	8·7	55	4·0	8·4	48	3·7	8·9
" 23	53½	3·8	8·8	41	4·1	9·1	51	4·1	8·7	57½	3·5	8·9
" 24	51½	3·7	9·0	17	4·0	8·9	53½	4·1	9·0	59	3·7	8·8
Average	**51·3**	**3·6**	**8·7**	**40·8**	**4·3**	**8·8**	**48·9**	**4·0**	**8·7**	**52·1**	**3·6**	**8·7**

	Lot I.	Lot II.
Total daily yield of milk . . .	92·1 pints.	101 pints.
Average percentage butter-fat . .	3·91	3·78
Average percentage "solids-not-fat" .	8·74	8·70

During the week ending April 25 the cows of Lot I. gave an average of 107 pints and those of Lot II. an average of 110½ pints daily, while the average butter-fat in the milk of both lots was 3·52 per cent in each case. The above results show:—

(1) That when the cows were milked at equal intervals (6 A.M. and 6 P.M.) the morning milk was the richer in fat, as it contained on the average 4·0 per cent as compared with 3·6 per cent in that of the evening.

(2) When, however, the evening milking took place at 4 P.M., after a ten hours' interval, then the evening milk had 4·3 per cent of fat as compared with 3·6 per cent in that of the morning.

(3) Equal intervals between milking gave about 6 per cent more milk in the evening than in the morning; but when the day interval was reduced to ten hours, 25 per

cent more milk was given in the morning than in the evening.

(4) The amount of "solids-not-fat" was practically the same in both cases.

(5) As the cows milked at even intervals gave on the average about 9 pints of milk daily more than the others, and as they had an initial advantage of only 3½ pints on the average daily, there is in this experiment an increase of about 5½ pints per cow daily from milking at even intervals. The average amount of fat in the milk of the cows milked at even intervals was slightly less than that of the others.

The cows were indoors at night, and were out on pasture for about eight hours daily.

As the tests were continued for eighteen days they were fairly thorough in character. Further tests are desirable, so that the relative effects of varying intervals between milking may be ascertained, as well as when the cows are always indoors or always outdoors, or indoors at night and out during the day.

There may also be variations owing to changes of season and of climatic conditions.

Cream-raising Tests at Offerton.

This series of tests was made to determine (*a*) whether it is possible to get the cream to rise to the same extent in refrigerated milk as in milk naturally cooled, and (*b*) to determine the percentage of cream which rises in milk refrigerated and subsequently warmed, as compared with milk which has not been warmed. It has been suggested that, as a means of improving the quality of morning milk, especially when milked after a long interval, the previous evening's milk might be mixed with it. These tests have a direct bearing upon this point.

Two sets of tests were made—a preliminary test in January 1904, and the second at various times in the beginning of 1905. A quantity of milk, warm, cooled, or mixed, was placed in numbered jars employed for the purpose, and allowed to stand for a number of hours, the percentage of cream being then measured. The results of the second set are given in the table on next page.

The figures in this table show that the amount of cream obtained from milk which has been refrigerated is generally less than when the milk is set warm.

When, however, the refrigerated milk, after standing a number of hours (such as evening milk which has stood overnight), is warmed up again to a temperature near that at which new milk is found when brought to the dairy, the amount of cream obtained from it may then even exceed what is obtained from new milk set immediately after leaving the cows. The same applies to mixed milk.

Date.	No. of jar.	Description of milk and state when set.	Temperature. Fahr.	Hours stand-	Percentage of cream.
	1	Straight from the cow . . .	87	12	16·5
	2	Cooled	48	12	15·5
	3	Cooled to 48° and warmed again to	84	12	18
	1	Straight from the cow . . .	85	12	15
	2	Cooled	44	12	12
	3	Cooled to 43° and warmed again to	86	12	17
	1a	Morning milk warm . . .	92	24	10·5
	2a	Evening milk, cooled, mixed with warm morning milk . . .	68	24	11
		Evening milk warmed from 68° to .	92	24	14·5
		Morning milk, warm . . .	93	12½	11·5
		Warm morning milk at 95° mixed with cooled evening milk at 44°.	65	12½	11·25
		Warm morning milk warmed from 65° to	92	12½	14
	1a	Warm evening milk . . .	90	12	16·5
	2a	Evening milk cooled . . .	47	12	14
	3a	Cooled to 48° and warmed again to	94	12	18
	1	Cooled evening milk mixed after standing twelve hours	47	12	11·5
	2	Warm morning milk . . .	84	12	10
	3	Nos. 1 and 2 mixed	63	12	15
	1a	Warm evening milk . . .	93	12	15
	2a	No. 1a cooled to		12	14
	3a	No. 1a cooled to 49° and warmed again to	92	12	17
	1	Warm evening milk	91	12	13
	2	No. 1 cooled	50	12	12·5
	3	No. 1 cooled to 50° and warmed again to	94	12	14
	1a	Warm morning milk . . .	91	12	10
	2a	No. 1a cooled to 50° mixed with cooled evening milk . . .	49	12	11
		Warm morning milk mixed with cooled evening milk which had stood twelve hours . . .	63	12	10

Summary of Results.

(1) *When fat may be low.*—The morning milk of a herd may frequently be under the standard of 3 per cent of fat when milking takes place early in the afternoon, to allow of this milk being retailed on the same day. An effective remedy is to milk at equal intervals, as has been shown by the Offerton results;

and when milking must take place early in the afternoon it is very desirable to again milk in the evening, refrigerate the evening milk, and mix it with that of the following morning. It has been stated that this cannot be done owing to the refusal of cream to rise under such conditions, but the Offerton tests show that there is in this no real difficulty. The morning milk also will be distinctly better in quality, though less in quantity, if evening milking follows early afternoon milking.

(2) The Alnwick and other tests show that the *milk of a few cows* may very frequently be under the standard, even when the intervals between milking are nearly even. When samples are taken from the milk of a few cows and found deficient, a prosecution should not be decided on till further investigations are made.

(3) *Appeal to the cow.*—This is not by any means a safe test. When the mixed milk of six cows was tested at Seaton Delaval there were two cases in which the variation in amount of fat was over 1 per cent in the afternoon milk within twenty-four hours. The Offerton and Broomhaugh results show that the variations from fortnight to fortnight may be considerable.

(4) *Effects of weather.*—The weather conditions have evidently a very important influence on milk production. This is especially noticeable in the Seaton Delaval results, where cold north and north-east winds have considerably lowered the fat contents of the milk. The milk of one cow at Cockle Park has been reduced in percentage of fat by cold nights in June and by hot days in July.[1]

(5) *Milk of excitable cows variable.*—Cows of an excitable and nervous temperament may show considerably greater variations than those of a quiet and docile disposition. This is shown by the results from individual cows at Broomhaugh. The milk of one cow at Broomhaugh, which dropped her milk easily, was also variable.

(6) *Regularity of feeding and milking.*—These are most important, so as to produce the best results as to quantity and quality of milk. Regularity in the length of time cows are turned out is also important. Feeding and milking are usually rather irregular on Sundays, and this causes great variation in the quantity and quality of the milk.

(7) Greater quantity of milk does not, as a rule, mean poorer quality, nor the reverse. This is well illustrated by the results of tests of individual cows at Broomhaugh and Offerton.

(8) It is desirable that cows which give poor-quality milk should not be retained in a breeding herd, as they are likely to breed poor milkers.

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[1] Confirmation of these results is given by the results at Offerton.

A NEW NITROGENOUS MANURE.

LIME NITROGEN OR CALCIUM CYANAMIDE.

By JAMES HENDRICK, B.Sc., F.I.C., Chemist to the Society.

MANY attempts have been made to fix the nitrogen which exists in a free state in boundless stores in the air and bring it into combination in forms useful in agriculture and other industries. One of the substances recently produced in this way is Calcium cyanamide, to which the popular name of lime nitrogen has been given. The method of making it in quantity by the use of electrical power was discovered a few years ago by Dr Frank of Charlottenburg, and since then it has been supplied to various agricultural experiment stations and other institutions by the Cyanid Gesellschaft of Berlin for the purpose of testing its agricultural value and use by means of field and other experiments. The results of many such experiments have been published during the last three years, especially in Germany.

In lime nitrogen, which has the chemical formula $CaCN_2$, the nitrogen is combined chemically with calcium and carbon in such a way that the pure substance contains 35 per cent of nitrogen. As manufactured, however, it is not pure, and contains about 20 per cent of nitrogen, or almost exactly the same proportion as is contained in sulphate of ammonia. It also contains a certain amount of free caustic lime, and a small amount of calcium carbide. It is a very fine dark-coloured powder resembling basic slag. It has a smell of acetylene, and when moistened gives off some acetylene. When placed in damp soil the nitrogen turns gradually into ammonia, and then undergoes nitrification in the usual way.

Field and pot experiments made with it in Germany indicate that as a nitrogenous manure it is little inferior, weight for weight of nitrogen, to standard manures like nitrate of soda and sulphate of ammonia. Arrangements are now being made to manufacture this product in quantity and place it on the market for sale in the ordinary way.

Last season, through the kindness of the Cyanid Gesellschaft, I received a supply of this substance for experimental purposes. I tried it, in comparison with nitrate of soda and sulphate of ammonia, both in pot and field experiments, which were carried out under the auspices of the Aberdeen and North of Scotland College of Agriculture. In each field experiment two plots were manured with the lime nitrogen at the rate of 1 cwt. per acre. On one of these the lime nitrogen was applied, as recommended by the producers, about a fortnight before the seed, and worked into the surface soil. On the other it was applied at the same time as the other manures, that is, with the seed. It is recommended that the lime nitrogen should be applied early and mixed with the surface soil so as to prevent it having any injurious action on the seed, and to avoid any possible loss of ammonia.

The field experiments were made on oats and barley. In all cases the plots were $\frac{1}{10}$th of an acre each. Five experiments in all were laid out. One of these was a failure, as the land proved to be in too high condition, and the plot with no nitrogenous manure bore just as heavy a crop as the variously manured plots. Two others were only partial successes—one because of a mistake made in cutting, the other owing to drought, which, as the land was thin, affected the plots seriously and unequally. The other two, one on oats and the other on barley, were completely successful, and gave very even uniform crops, which were harvested in splendid condition, and gave the results shown in the following table:—

RESULTS OF EXPERIMENTS ON OATS AND BARLEY AT SURRADALE, ELGIN, AND WESTER DURRIS, KINCARDINE.

Weights given in lb. per acre.

Plot.	Manuring per acre.	OATS (Surradale)			BARLEY (Wester Durris)		
		Grain	Straw & chaff	Total	Grain	Straw & chaff	Total
1	No manure	3580	3800	7380	1410	2184	3594
2	Superphosphate, 2 cwt. Muriate of potash, 1 cwt. . .	3580	4260	7840	1710	2156	3866
3	Same as 2, and Sulphate of ammonia, 1 cwt. .	3940	4180	8120	2180	2856	5036
4	Same as 2, and Nitrate of soda	3790	4730	8520	2160	2968	5128
5	Same as 2, and Lime nitrogen, applied early, 1 cwt.	3950	4670	8620	2060	2492	4552
6	Same as 2, and Lime nitrogen, applied with seed, 1 cwt.	3940	4680	8620	1950	2601	4551

In both these experiments the crops were considered good heavy crops for the land and season. The nitrate plots, No. 4, were in both cases latest in ripening, and the cyanamide plots, 5 and 6, were a little earlier than either the nitrate or sulphate of ammonia plots. There is little difference between the cyanamide plots. Plot 5 started a little better than plot 6, but 6 made up on it later in the season. The results show that the cyanamide gives returns very little behind those given by nitrate of soda or sulphate of ammonia.

The amount of nitrogen applied to the plots 3 to 6 in the different forms was the same. The sulphate of ammonia and the cyanamide contained practically the same percentage of nitrogen. The nitrate of soda was applied at the rate of 142 lb. per acre to make up for its smaller percentage of nitrogen.

So far as the other field experiments and the pot experiments gave any results, they also showed that nitrogen applied in the form of cyanamide gives returns only a little inferior, so far as weight of crop goes, to those yielded by the standard manures nitrate of soda and sulphate of ammonia. In no case did any injury appear to be caused to the germination of oats or barley by using the cyanamide at the rate of 1 cwt. per acre along with the seed.

I desire to express my thanks to those gentlemen who assisted me with these experiments and supplied me with the land and labour necessary to carry them out.

ANALYSES FOR MEMBERS DURING 1905.

By JAMES HENDRICK, B.Sc., F.I.C., Chemist to the Society.

DURING the year 78 fertilisers, 29 feeding stuffs, and 37 miscellaneous samples—soils, milks, waters, and sheep dips—were submitted to me for analysis. In addition, I received a number of communications from members asking for information on various subjects.

With the exception of the ground lime samples, few of the fertilisers call for any remark. Many of them are forwarded to me without any information at all. Often the sample is merely labelled "manure," and there is nothing else to indicate its nature. It would save much trouble if members would indicate in every case the nature of the manure and the constituents which require to be determined. Also in many cases I would be able to give the members more information as to the quality of the manure, and whether it was good of its kind and suitable for the purpose for which it was sold, if they would supply me with the data necessary for forming an opinion on these matters.

Ground Lime.

The great majority of the samples of ground lime were of low quality. Out of 14 samples submitted only 3 contained over 70 per cent of caustic lime. Good samples of ground lime should contain at least 70 per cent of lime in the caustic or alkaline form. In samples made from high-class rock which has been properly burned over 80 per cent may be expected. Several of the samples submitted were rubbishy articles containing under 40 per cent of alkaline lime, and containing large percentages of sand and other impurities.

If I may judge by the samples submitted to me during last season by members and others, a very large proportion of the ground lime on the market in Scotland was of inferior quality. I am informed that the demand for ground lime increased very greatly last season, and that in many cases there was a difficulty in supplying it. Some of the makers appear in these circumstances to have yielded to the temptation to grind up much impure and underburned stuff which it would have been difficult to have disposed of otherwise, and to have sold it as ground lime. If this article is to maintain its good name and to command the confidence of agriculturists it will require to be turned out of better and more reliable quality. Buyers when purchasing it should insist on a guarantee of 70 per cent of lime in the caustic or alkaline condition.

Basic Slag.

Various kinds and qualities of this article are sold, and the purchaser should look not merely to the price per ton, but to the percentage of total phosphate, the solubility of that phosphate, and to the fineness of grinding. As a rule in this country only the total phosphate is determined, and the value of the slag is mainly based on that. As different samples of slag vary considerably in solubility, it would be an improvement on this practice if the solubility as determined by the standard method, with 2 per cent citric acid, were also taken into account. The phosphate of slag is not soluble in water, but if the slag be of good quality, at least 80 per cent of the phosphate should be soluble in citric acid. Some of the slags on the market claim to have over 90 per cent soluble in citric acid. In future it will be my practice to report on the citric solubility of samples of slag submitted to me, and I would recommend members to ask for a guarantee of solubility, as well as of total phosphate, in purchasing slag.

Feeding Stuffs.

A few samples of feeding stuffs, and in particular a sample of bean-meal, deserve to have attention called to them. A sample sold as an "Improved Decorticated Cotton-Cake" was an inferior article, containing only a small percentage of decorticated cotton-seed. It was composed mainly of cereal offals, locust-bean-meal, and undecorticated cotton-seed. The main "improvement" seemed to consist in giving a low-quality composite cake a name which should have represented a high-class article. A sample sold as linseed cake, and "guaranteed 95 per cent pure," was found to contain a large percentage of impurities, largely made up of weed seeds. It was also dirty. This inferior article was sold at the price of linseed cake of good quality. Another sample of "linseed cake" turned out to be a composite cake of very ordinary quality.

Poisonous Bean-Meal.

Towards the end of the year a sample of bean-meal was received from a member in Mid-Lothian, which was said to have caused the deaths of several cattle which had eaten it, and very serious illness in the case of others. The beans were described as Rangoon beans. The analysis showed the meal to contain the normal constituents of beans, and no seed other than beans could be detected in it. Various poisoning cases with beans which occurred several years ago were traced to the presence in the beans, which came from India, of a poisonous variety of *Lathyrus*. I could not detect this seed in the meal, and the symptoms, so far as I could get a description of them, were not those of *Lathyrus* poisoning. No post-mortem had been made on any of the animals, and I was unable to get any help from the veterinary side.

At this time a very serious case of poisoning was reported from a farm in Dumfriesshire. I entered into communication with the experts engaged in the case, and found that there the poisoning was traced to prussic acid. I also learned that during the past few years investigators, including Professor Wyndham R. Dunstan of the Imperial Institute, had discovered in a certain variety of kidney bean, *Phaseolus lunatus*, which is grown in the East, used there as food, and also imported to this country as food, a substance which, when the bean is moistened, produces hydrocyanic or prussic acid. This substance is a glucoside similar to the prussic-acid-producing principle found in bitter almonds, peach, and cherry kernels, &c. Certain samples of the beans, especially those which are deeply coloured, produce more of the poison than others. The beans which contain this substance are known as Lima or Duffin beans, and are imported under such names as Burma beans, Rangoon beans, Java beans, and Paigya or Pegyi beans.

Having obtained this information, I tested the sample for hydrocyanic acid and found that it yielded a small amount, under $\frac{1}{100}$th part of one per cent, of this deadly poison. This small amount is quite sufficient to account for the poisoning which occurred. Attention cannot be drawn too widely to the fact that bean-meals made from these beans may be extremely poisonous. The whole subject calls for very thorough investigation, so that we may know what beans contain this poison, and how far it is safe to use Rangoon, Java, and other eastern beans.

Some of the beans sold as Rangoon do not consist of *Phaseolus lunatus*, and some varieties of *Phaseolus lunatus* are not poisonous. In the present state of uncertainty all such beans should be treated with suspicion.

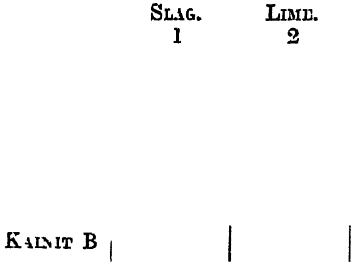
TOP-DRESSING PASTURES.

Slag, Kainit, and Lime.

By R. Shirra Gibb, Boon, Lauder.

This experiment, begun in 1898, was intended for hill grazings and pastures that had not been manured for a long time, if ever. In order that the manures should get well down to the soil, it was recommended that where the pasture was very rough or matted with old grass residues, these should, in the first place, where possible, be removed by cutting or burning.

The manures experimented with contained phosphoric acid, potash, and lime, but no nitrogen. They were applied with the view, among other things, of encouraging the growth of clover, for the purpose of eventually bringing nitrogen into the soil from the air. This being necessarily a slow process, it was desired that the reports of the experimenters should extend beyond the first season after the application of the manures.



The whole area of the experiment was about an acre—70 yards long and 70 yards broad—divided lengthwise into two sections, 1 and 2; and crosswise into two sections, A and B, as in the accompanying diagram, and manured as indicated.

Section 1 from top to bottom got Thomas slag at the rate of 10 cwt. per acre.

Section 2 from top to bottom got ground lime at the rate of 1 ton per acre.

Section A got no cross manuring.

Section B from side to side got kainit at the rate of 5 cwt. per acre.

The experiment was carried out by over twenty landowners and tenant-farmers in different parts of the country, and to these the Society is much indebted for valuable assistance.

It was desired that the experimental area should be on a piece of pasture as uniform in character as possible, and the manures applied in calm weather so as to prevent their being blown from one section on to another, and that before applying the manures the sections should be marked out by means of pegs driven well into the ground and lines drawn between them by means of a cord or otherwise.

The effects of the manures were to be gauged by carefully noting any change in the nature of the grasses that might occur on each of the four plots, especially the relative abundance of clover and the bareness to which the grass was eaten.

In case the grass should be cut for hay, the produce of each of the four plots was to be kept separate, weighed as hay, and carefully-taken samples preserved for examination.

The actual amounts of manure supplied for this experiment were as follows:—

Section 1.	Thomas slag, . .	5	cwt.
" 2.	Ground lime, . .	10	"
Cross Section B.	Kainit, . . .	2½	"

It was intended that this experiment should have been reported on two or three years ago, but the much-lamented illness and death of Dr Aitken, who had charge of it, prevented this being done. At the request of the Science Committee of the Society I have gone over the various reports sent in by over twenty experimenters in various parts of Scotland, and I venture to think the results are sufficiently interesting to warrant their publication in the 'Transactions.' I have endeavoured very briefly to note the details reported of the various experiments, and have attempted to tabulate the results of the more interesting, and to draw attention to some of the conclusions which seem to me indicated more or less clearly by the experiment as a whole. In some cases the soil and subsoil have been analysed, and the results are introduced in tabular form.

The following notes relate to the different experimental areas.

Mr Robert Cowan, Erchless, Beauly.

The manures were applied December 1899. The report for 1900 was to the effect that kainit had killed the fog or mosses, but had made the grass slower in coming. Slag and lime both had made the grasses stronger and greener.

Mr Wm. Reid, Titwood, Mearns, Renfrewshire.

The soil is a light reddish loam overlying whinstone rock, which is near the surface. The elevation is about 500 feet, and the exposure southerly or south-easterly.

The field had been grazed by young cattle for nine years, the herbage being mostly wild natural grasses, mosses predominating.

The manures were sown in February 1899. The spring following was late, and the cattle were not put on till the 5th of May. The summer was fairly dry.

In the autumn of 1899 the slag and kainit plot 1 B showed a fine green sward, small-leaved clover was increased, and the plot eaten bare. The slag alone plot 1 A was in much the same condition, the clover-plants being if anything rather more abundant. The kainit and lime plot 2 B looked fairly well early, but the slag-treated plots looked best at the end of the season. The lime alone plot 2 A grazed very little better than the surrounding untreated pasture, though the mosses were to a large extent burned out.

In the autumn of 1900 the plots were put by Mr Reid in the same order. 1 B, the slag and kainit plot, showing abundance of clover; the slag alone plot 1 A being nearly as good, but the clover being rather less vigorous; while on the lime and kainit plot 2 B the clover was lacking, and the lime alone plot 2 A very little better than the surrounding undressed pasture.

In spring it was noticed that the slag plots showed green earlier than the others. This ground has now been ploughed.

Mr A. M. Gordon of Newton, Insch.

The field on which this experiment was carried out was a good average loam, with southern exposure, and about 350 feet above sea-level, laid down to grass twenty-eight years ago with ordinary clover and ryegrass, also a little cocksfoot and timothy. Previous to being renewed at that time it had been a very old pasture, which had been pastured with cattle in the usual way.

The manures were sown in good condition and in favourable weather in March.

The plots were fenced and cut for hay. The kainit and lime plot 2 B had in this case given the heaviest weight of hay. The crop was a heavy one, owing to the abundance of timothy. Early in the experiment a greenness and freshness of the clover on the slag and slag and kainit plots 1 A and 1 B was reported, but there was no extra weight in the hay crop. Mr Gordon generally reports that the result is in favour of the lime and kainit, but that on the whole kainit seemed to be the winning fertiliser.

Mr Charles Howatson of Glenbuck.

This experiment has been conducted on a rough twenty-year-old pasture showing a marked absence of clover, at an elevation of about 800 feet, the soil being black and mossy, with a tilly subsoil. The field was grazed with both sheep and cattle.

In the autumn of 1899 the whole area showed to have been eaten barer than the rest of the field, and seemed preferred by stock. There was, however, no difference discernible in the appearance of the various plots.

In the autumn of 1900 the best plot was that dressed with slag and kainit, 1 B. The pasture on this plot showed a richer green, and sheep seemed especially to prefer it. It was eaten barer than any of the others. Plot 1 A, slag alone, was also improved, and was well eaten, though not so markedly so as the plot 1 B with the kainit added. There was no difference visible in the lime or lime and kainit plots.

In the autumn of 1903 the effects on 1 A and 1 B, the slag alone and slag and kainit plots, has been lasting, and there was no difference in the two plots, the slag alone having overtaken the slag and kainit plot, which was reported the best in 1900, the grass being of a richer green and eaten very bare.

The lime and lime and kainit plots did not show any difference from the rest of the field.

Mr Wm. Taylor, Park Mains, Renfrew.

The soil is poor and moory, and mixed with grey sand, 150 feet above sea-level. The pasture is sixty years old, and grasses not of the best quality. The field called the Moor park was generally pastured, along with the adjoining and better field, by horses, cattle, and sheep. Occasionally these have got extra feeding, and the field has got a dressing of compost within the last twenty years. The manures were sown on 24th February 1899.

In autumn 1899 the best plot was slag and kainit 1 B, but no apparent difference was ascertainable as far as clover was concerned. This plot was early green and fresh, and from the first was liked by the stock. Slag alone 1 A was also very bare eaten, and looked fresh and green, though not so early as 1 B. The lime and kainit plot 2 B was distinctly inferior to 1 B and 1 A, but better than lime alone 1 B; no difference, when compared with the rest of the field, being visible on this latter plot.

In autumn 1900 the leading plot was still the slag and kainit 1 B, the whole area of the plots being, however, greener than the rest of field. The slag alone plot 1 A was second, lime and kainit 2 B being third, but clover not much more in evidence.

In autumn 1905 the improvement on the slag and slag and kainit plots are still lasting, and Mr Taylor is of opinion that the improvement has been profitable on this field. On another field of ten-year-old pasture, called the Gateside field, the same experiment was carried out, the soil in this case being more mossy. Here there has been no noticeable result, probably this pasture being less in need of manure of any kind. The analysis of the soil of both the Moor park and the Gateside field is given on page 92.

Sir A. E. Orr-Ewing, The Claylands, Ballikinrain, Balfron—
per Mr D. Blair.

The soil here is a sandy loam, at an elevation of 380 feet.

The grass was laid down about twenty years prior to 1898 with lime and dung, the field being then reclaimed from moor.

The rainfall is heavy, and the exposure south-east.

The grasses were very poor, and it was estimated to take about 3½ acres to graze a two-year-old Ayrshire heifer.

The manures were applied in good condition in frosty weather in February 1899. Mr Blair reports in 1900 that manures have made no visible difference in any of the plots nor from the rest of the field. Owing to Mr Blair leaving Ballikinrain, no report has been obtainable since. I have, however, been enabled to visit this plot, and its whereabouts being pointed out, it was possible with comparative accuracy to define its limits and note a considerable difference when comparing it with the surrounding parts of the field, even though rabbits form the major part of the stocking. Had reports been obtainable between 1900 and 1904, there is little doubt a considerable improvement would have been noted.

Mr James Thomas, succeeded by Mr James Allan, Drumtian, Killearn.

The soil was a thin retentive clay, which will not repay cultivation, at an elevation of 170 feet. The pasture is about thirty years old, short, hard, and "foggy," unmanured previously, and grazed with Ayrshire heifer stirks—about one heifer to 2¼ acres—and occasionally a few sheep for a short time.

The rainfall is heavy, and especially during spring months.

The manures were applied in February 1899, heavy rains falling immediately after.

In the autumn of 1899 it was reported that the slag and slag and kainit plots 1 A and 1 B were the best, the cattle eating them bare, and the clover growing fast, and that no difference could be discerned between them, except probably that 1 B was a little earlier in showing improvement. Little or no result could be traced in the appearance of the lime or lime and kainit plots; if anything, the lime and kainit might be the better.

In the autumn of 1900 Mr James Allan—Mr Thomas having left the farm—reported the slag alone plot 1 A as being "truly A1," having an abundance of clover, and being the most greedily eaten part of the field. The slag and kainit plot 1 B was inferior to slag alone. The other plots, especially kainit and lime 2 B, being no better than the rest of the field. But the lime alone 2 A had shown some improvement in the later part of the season.

In July 1905 I was able to visit these plots. Mr Allan had in the meantime top-dressed the rest of the field with 6 cwt. of slag per acre. There had been a strong drought prior to the time of my visit, and all pastures were unusually bare. Mr Allan was of opinion that, even though the results of a slag dressing was so marvellously apparent when newly applied, a heavier dressing would be required to make the improvement anything like permanent, and he was doubtful whether it would pay. Certainly, judging from the appearance of a neighbouring field which had been recently treated with slag, and was showing white from the mass of clover-plants in flower, so much so that in the distance the neighbours thought lime had been applied, it would be difficult to find any more convincing evidence of the benefit of the application of that manure. It is possible, however, that the continued applications which might be required on this poor thin clay to make the improvement permanent would involve too much expense to be remunerative. The report puts the improvement by slag application at at least 10s. per acre for the first three years—if there is any benefit during future years from the first application there should be no loss, but considerably the opposite, from the dressing. The analysis of this soil is given on p. 92.

Mr Alexander Cross, Knockdon, Ayrshire.

The soil was black and moory on surface and clay beneath. The grass was thirty years old, valued at from 7s. 6d. to 12s. 6d. per acre, and pastured with horses, sheep, and cattle at different seasons of the year. The grazing season of 1899 was very good, that of 1900 very unfavourable and wet.

The manures were sown in February 1899.

In autumn 1899 no improvement was visible except on slag and kainit plot 1 B, which seemed a little darker green, with more clover showing.

In autumn 1900 it was seen that the slag alone plot 1 A had grown remarkably during the season, and was quite rich and green, and looked like still further improving. The slag and kainit plot 1 B was better the former year than the slag alone plot, but this latter had made up and looked fresher; but it was very difficult to say which was really the better, only 1 A seemed improving faster. The lime and kainit plot 2 B was rather better than lime alone 2 A, this latter being barely distinguishable from the undressed land alongside, probably only a little better eaten.

Mr David Osborne, Craig of Neilston, Renfrewshire.

The soil was a reddish clay, of medium quality for the district—elevation, 600 feet. The field has been about forty years in grass, being sown down after a manured green crop, and has always been grazed by dairy cows and a few sheep. The climate is generally moist, but the summer of 1899 was very dry. The manures were sown in good condition in the end of February.

In the autumn of 1899 the slag plots 1 A and 1 B appeared much barer eaten and darker in colour, with more clover showing. The kainit plots 2 A and 2 B showed no improvement on, but were no worse than, 1 A and 1 B, except that the grass had a more burnt appearance. The lime plots 2 A and 2 B were improved, but not so much as the slag plots.

In the autumn of 1900 the slag alone plot 1 A showed the grass to be very bare, but clover abundant. The slag and kainit plot 1 B showed great improvement, but not so marked as with slag alone, being neither so green nor so plentifully mixed with clover. On the lime plots 2 A and 2 B the grass was undoubtedly shorter, but the improvement in the growth of clover not very marked.

In the autumn of 1901 the slag alone plot still continued bare and full of clover. The kainit plots seemed inferior to the slag plots, while the lime alone plot looked well and had nearly made up on the slag plots. In 1905 Mr Osborne reported the benefit of slag and lime to be very evident.

Mr Wm. Cairns, Glenfinlas, Callander, West Perthshire.

The soil is a light sandy loam, and has not been ploughed or manured for forty years—elevation, 400 feet. The rainfall is often from 60 to 90 inches a year. The herbage was rough and poor quality, and gets withered and dry in winter, but in spring, summer, and autumn is soft and causes a considerable death-rate in sheep. It was burned before the sowing of the manures on 18th April 1899. The field was grazed with cattle.

In the autumn of 1899 the kainit and lime plot 2 B was the best eaten section. On the slag and kainit plot 1 B the clover was increased to a considerable extent. The lime plots 2 A and 2 B seemed to be specially favoured, the cattle being fond of these plots. The slag alone plot 1 A was barer than the surrounding pasture and had the appearance of more clover.

In the autumn of 1900 the slag plots 1 A and 1 B showed a distinct increase of clover. These slag plots being about equal, showed no advantage from the use of kainit. The lime plots 2 A and 2 B were much sweeter and barer eaten, and the grass certainly better, but did not show much increase of clover.

Mr Cairns thinks if cartage was not so heavy (9 miles), it might pay to lime some of the hill-land.

Kippo, Kingsbarns, Fife—per Mr James Nicoll.

The soil of the field is a cold strong clay, with northern exposure, about 250 feet above sea-level. It was sown down about 1890, and had been pastured with sheep for the past five years. The pasture had got coarse and fogged so that stock would not eat it. It was top-dressed for five years in succession with ½ cwt. nitrate of soda and 1½ cwt. fish manure per acre. The climate may be classed as dry. Two experiments were tried here and have produced the same results. For the one the manures were sown in February 1899, for the other in December 1899. Both areas were cut for hay, the one in 1899 and the other in 1900. On the plots which were sown in 1899 the hay was cut on the 18th July, and weighed about a month later,—the plot in each case being about a quarter of an acre in extent. Mr Nicoll reports that the slag alone plot 1 A gave 8 cwt. of hay of good quality, but a little overpowered by clover. The aftermath was eaten by sheep, and showed plenty of clover and sweet grasses. The slag and kainit plot 1 B gave 9½ cwt. hay. The clover was in excess, but the finer grasses were also present, and the hay, but for the excess of clover, was better quality than on any of the other plots. The aftermath was marked by strong growth of clover and seemed to graze about double the usual number of sheep. The lime alone plot 2 A gave 9 cwt. of hay, much coarser, and the clover was plentiful: it was much closer to the ground. The grasses grew well in the aftermath, but the sheep did not settle so well as on the slag plots.

The lime and kainit plot 2 B gave the heaviest weight of hay, 10 cwt. 3 qr. The grass was long, with sufficient clover, but not so much as on the slag plots. The hay was good, but coarser than on the slag plots. The aftermath was not so well eaten. The sheep would pass over the lime alone plot, and only a few would be seen on the lime and kainit plot, while the two slag plots would be covered with sheep.

Mr Nicoll reports on these plots in March 1900 and again in April 1901, and has kindly favoured me with a report down to September 1905.

The slag plot 1 A had in 1900 a large quantity of white clover and was eaten very bare, but a little "fog" still showing. In 1905 this plot still shows good grass and clover, and is eaten bare in spring and summer.

The slag and kainit plot 1 B came early in 1900 and seemed finer quality than the slag alone plot, and as the summer advanced became a sheet of white clover, and was eaten very bare, keeping one-third more sheep than the untreated part of the field. In 1905 this plot is still found to be far ahead of all the others for fine grasses and clovers, and still keeps one-third more sheep than the average of the field. The lime alone plot 2 A shows no result, and the lime and kainit plot 2 B can be traced, but not to such extent as to make the dressing seem profitable.

With regard to the duplicate plots on which the manures were sown in December 1899 and cut for hay in 1900, the reports of April 1901 and September 1905 fully correspond with those given above, and clearly indicate the advantage of both slag and kainit on this soil and under the conditions of previous treatment this field has had. Slag alone seems to have done well, but in conjunction with kainit it has done much better.

The analysis of this soil is given on page 92.

Mr John Drysdale, Arngibbon, Port of Menteith.

This is rough hill land, at a considerable elevation above the carse. There was a good deal of roughness and old leaf residue at the time the manures were sown. Both the slag and slag and kainit plots have been closely eaten by sheep ever since the manures were sown. Clover-plants seem to have appeared and increased during the intervening years. If anything there has been a shade more clover visible on the slag and kainit plot 1 B than on the slag alone 1 A; but as both plots have been always, even up to 1905, eaten very bare, the increase of herbage could not be easily estimated. There has been no visible result from the application of lime or mixture of lime and kainit. Mr Drysdale thinks the roughness of the pasture in its original state may have prevented the action of these ingredients.

Another piece of ground which I saw when I visited Arngibbon in July last, which had been top-dressed with slag and kainit, was looking uncommonly fresh and good even in the height of the drought; and Mr Drysdale has informed me later that the appearance of improved grazing has been fully borne out by the condition of the sheep when sent to market.

Boon, Lauder.

At Boon, I have myself conducted this experiment on four different parts of the farm. The first area tried in 1898 was in a 25-year-old pasture field, on moory, black-topped soil, with a heavy, deep, and damp clay subsoil, tile-drained in 1873. The pasture was very rough and practically uneaten, agrostis largely predominated, only a few sickly clover-plants showing here and there ; to compare with this a part of the moorland was pinned off, and the same manures sown. The prevailing grasses were agrostis, aira cespitosa, festuca ovina, nardus stricta, and sedges, with a little heather here and there. In 1899 two other plots were staked off. One on a thin, shallow, moory clay, with a very hard subsoil of reddish till. The grasses were poor and wiry, and generally vegetation was anything but luxuriant. Agrostis and sweet-scented vernal were the most prominent grasses, and what clover-plants could be seen were poor and sickly.

The fourth area was also on a clay, but of a richer, deeper nature, with a more gravelly subsoil. With the exception of the moorland plot, all these experimental areas show the same results to-day. The slag alone plots without exception were the first to show themselves, but not till the second summer, or eighteen months after the manures were sown. The lime alone coming on about a year later. Kainit has uniformly retarded the action of the slag and the lime, and only now, after about six years, when the sourness caused by the kainit may have disappeared, are these plots showing a distinct improvement.

The lime alone and slag alone plots are to-day very bare, and very little difference can be noted between them. The results are most marked, and the plots generally require no pins to distinguish their whereabouts. The least improvement has been made on the moorland unbroken pasture, and I do not think the slight change noticeable is enough to encourage treatment of this class of land with manures. The plot on the clay with the gravelly subsoil is not so much improved as where the subsoil is more retentive. The whole of the plots are better now than they have ever been, and can be observed a long way off.

The analysis of the soil of the first plot is given at page 92.

Mr Hugh M. Leadbetter, Legerwood.

Two experiments were tried on the farm of Legerwood—one on a thin strong clay with a strong subsoil, but not naturally wet, at an elevation of about 850 feet. By some error the full quantity of lime did not arrive for this plot, and what lime did arrive was sown with the slag.

The pasture is over thirty years old, and consists of agrostis largely, with a few plants of the poas and fescues with weak crowded-out clover-plants. The manures were sown in April 1899.

In autumn of 1900 1 A, the slag and lime plot, was full of green and vigorous clover-plants and eaten bare. 1 B, the slag and kainit plot, was still rough, with a lot of dead grass, but clover-plants looked fresher and made a fair show. 2 B, the kainit alone, showed no appreciable change—that is, no difference from untreated ground adjoining.

In 1905 the slag plots were still showing green and bare eaten, the slag and lime being far ahead of slag and kainit. There was no visible improvement on the plot which got kainit alone.

The second experiment was also on a clay plot, but not stoney like the first, and was naturally wet, with a strong tilly subsoil, also about 850 feet.

The pasture was about forty years old, the plants generally being rather poor and sickly, agrostis predominating with small white clover-plants visible all over. The lime sent here also was deficient, and was sown only at the rate of 10 cwt. per acre.

In autumn 1900 the slag alone plot 1 A was very closely eaten down and a beautiful green colour. The slag and kainit plot 1 B was much improved, but rougher than the slag alone plot. The lime alone plot 2 A was, even considering the small dressing applied, better than the lime and kainit plot 2 B.

The analysis of the soil of the plots in the second experiment is given at p. 92.

In 1905 it is to be noticed that the improvement from the dressing of slag alone still continues very marked, and is still better than the slag and kainit. The lime plots are the same practically; that which got the kainit in addition being, if anything, a little barer eaten.

It may be of interest to mention a plot in an adjoining pasture-field which was dressed with 10 cwt. of slag at the same time as this experiment was begun. The soil is also a stoney clay. The benefit from this dressing can be observed for miles, and so struck Dr Aitken, on a visit he made to this farm, that he took samples of the soil for analysis, the results of which are here given along with the soil analysis of the Weens field on which the second experiment was placed.

Mr J. T. Lindsay, Whitehope, Selkirk.

As on the farm of Outerston, Gorebridge, no change to speak of has been produced by the manures. The subsoil in this case is gravel.

Mr John Caverhill, Jedneuk, tried this experiment on a grass park at Monteviot and also on hill land at Crichness, in the Lammermoors, and no improvement has been observable even up to this year.

Mr C. H. Scott Plummer of Sunderland Hall.

The soil here shallow, tilly, and not far from slatey rock, about 800 feet.

The grasses were sown down with a crop of oats in 1890. The mixture comprising 13 lb. ryegrass, 8 lb. cocksfoot, 2 lb. sheep fescue, 3 lb. fiorin, 1 lb. yarrow, 1 lb. ribgrass, and 11 lb. clover.

There is a close bottom of grasses of a kind and a good supply of clover. No manure has been applied since the turnip crop of 1889, when the crop was eaten on the ground by sheep. It was broken up from hill pasture about 1870 and limed at that time.

The manures were sown in fine weather on moist ground, dry weather succeeding for about three weeks, then a month's rainy weather, followed by a remarkably dry summer.

In autumn 1899 no difference could be observed in any of the plots compared with the rest of the field, neither in the growth of clover nor the bareness with which the sheep had eaten.

In autumn of 1900 there was little difference to be seen in the plots, or even in comparison with unmanured ground adjoining, no excess of clover being visible. The kainit plots may be, if anything, barer eaten. This slight improvement does not seem to have been maintained. The analysis of the soil and subsoil of this field is given at p. 92.

Sir Robert D. Moncreiffe of Moncreiffe, Bart., Bridge of Earn.

The plots at the Home Farm were on old pasture grazed by cows. The slag and kainit plot 1 B is reported to show better results than slag alone 1 A, but both show increase of clover. On the other plots no improvement from the rest of the field is reported.

John Speir, Newton, Cambuslang.

A slight appearance of the lime and kainit being better eaten was noted by Mr Speir in 1900. Subsequent reports do not indicate that this feature was permanent, no results from any of the plots being apparent.

Mr Crichton, Parduvine, Gorebridge.

Mr Crichton can trace no results from the manuring of any of the plots. The field in which the experiment has been conducted has had a large amount of feeding-stuffs eaten on it from time to time. Probably no manurial ingredient was required here.

Mr James J. Gillespie, St Colme's, Ballinluig.

The experiment at St Colme's was on fifty-year-old pasture, with a thick surface of turfy coarse grasses and very mossy (foggy), so that none of the manures had much chance to act properly. The plots could neither be cut with scythe nor burned. There were clover-plants, but they were very slender, doubtless owing to the overcrowding. Mr Gillespie remarks that a stranger going over the ground would not see enough difference to indicate where manures were sown.

Mr Walter Elliot, Langburnsheils, Roxburghshire.

This experiment was on hill land similar to large areas on the Cheviot Hills. No special benefit has resulted from the manuring, even up to the present time.

From an examination of the following table it will be seen that in six out of the thirteen reports the slag and kainit plot 1 B is the best, but that in four cases, namely at Glenbuck, Park Mains, Titwood, and Arngibbon, the slag alone plot 1 A is characterised as being almost as good. It is therefore probable that in these four cases the extra cost of the kainit has not been repaid. The slag alone plot 1 A is reported in five cases out of the thirteen as being absolutely the best. In these cases it would seem as if the addition of the kainit had in some way retarded the action of the slag; and at Drumtian, Craig of Neilston, and Boon this adverse action has been very marked.

The kainit, when combined with lime, has in six cases out of the thirteen produced better results than by the use of lime alone, while in four cases the addition of the kainit has again had a harmful effect—namely at Drumtian, Craig of Neilston, Boon, and Legerwood. That in the six cases in which the combination has given better results the kainit has repaid itself may be considered doubtful; probably it may at Newton, Insch, and at Glenfinlas.

SUMMARY OF THIRTEEN REPORTS.

Experimenter.	Nature of Soil.	Slag alone. 1 A.	Slag and Kainit. 1 B.	Lime alone. 2 A.	Lime and Kainit. 2 B.
Mr A. M. Gordon of Newton, Insch.	Good loam.	Fresher and greener.	Fresher and greener.	Little effect.	Best plot.
Mr Ch. Howatson of Glenbuck.	Black and mossy; tilly subsoil.	A good second; nearly as good as 1 B.	Best plot.	No effect.	No effect.
Mr Wm. Taylor, Park Mains, Renfrew.	Moory, and mixed with grey sand.	Second plot not quite so early as 1 B.	Best plot.	Little effect.	Better than 2 A.
Mr H. M. Leadbetter, Legerwood, Berwickshire.	Clay, with clay subsoil.	Best plot.	A good second.	Third best.	Little or no effect.
Mr James Allan, Drumtian, Killearn.	A strong blue clay, very retentive.	Best plot.	Distinctly inferior to 1 A.	A little improvement.	No effect.
Mr Alex. Cross, Knockdon, Ayrshire.	Black moory soil on clay subsoil.	Best plot.	Nearly equal to the best.	A little improvement.	Slightly better than 2 A.
Mr Osborne, Craig of Neilston, Renfrew.	A reddish clay on rocky subsoil.	Best plot.	Not much improved.	Second best plot; improving.	Little or no improvement.
Mr Cairns, Glenfinlas.	Light sandy loam.	Good, with best clover.	Good; nearly equal to 1 A.	Good; well eaten.	Good; best eaten.
Sir Robert Moncreiffe, Bridge of Earn.	...	Second best plot.	Best plot.	No change.	No change.
Mr Reid, Titwood, Mearns, Renfrewshire.	Light soil on whinstone rock.	Nearly equal to the best.	Best plot.	Very little improved.	Barer eaten, but little clover.
Mr R. S. Gibb, Boon, Lauderdale.	Moory clay on tilly clay subsoil.	Best plot.	Improved, but very inferior to 1 A.	Very good; almost equal to 1 A.	Not half the improvement of 2 A.
Mr Nicoll, Kippo, Kingsbarns, Fife.	Strong cold clay.	Good, but inferior to 1 B.	Best plot.	No effect.	A little improved; still poor.
Mr John Drysdale, Arngibbon, Stirlingshire.	Rough hill.	Almost equal to 1 B.	Best plot.	No effect.	No effect.

On the more or less moory and black-topped soils at Glenbuck, Park Mains, Knockdon, and Boon the best results have been got by slag. On the first three places the kainit does not seem to have done harm, and may have done a little good. At Boon its use has been distinctly harmful.

On the clays and clay subsoils at Legerwood, Drumtian, Boon, and Craig of Neilston slag alone has done best, kainit having seemingly been detrimental.

At Kippo, in the East Neuk of Fife, where the soil is also a heavy clay, the kainit has been of distinct benefit, both when combined with lime and slag. It may be pointed out that the pasture at Kippo had for five years prior to the experiment been receiving annually a strongly nitrogenous top-dressing. The natural inference in this case is, therefore, that both potash and phosphate should do good.

On the lighter soils at Titwood, Glenfinlas, and Newton, Insch, the results seem to vary, from circumstances probably not having much relation to this experiment.

With regard to the seven plots on which no result from any of the manures has been recorded, it is possible that at Newton, Cambuslang, and Parduvine, near Gorebridge, as on the Gateside field at Park Mains, the soil was rich enough to produce full results without the addition of any manures. At St Colme's, Ballinluig, the close-tufted nature of the herbage, along with probably the gravelly subsoil, may have caused the absence of results. In Mr J. V. Lindsay's case the gravelly subsoil and the very dry summer may also be credited with the barrenness of result. It is less easy to account for the state of matters at Sunderland in Selkirkshire, at Crichness in the Lammermoors, or Langburnshiels and Monteviot in Roxburghshire. The soil and subsoil analysis of the Sunderland field show it to be in fairly good heart.

ANALYSES OF SOILS.

An examination of the table on the next page, giving the analyses of the soil of the seven plots selected by Dr Aitken, does not help much to a clearer understanding of the condition of these plots at the beginning of the experiment; and I do not feel competent to draw conclusions from the results as reported, when they are compared with the soil analyses. I may, however, suggest that as the soil at Drumtian seems to contain fair quantities of the manurial ingredients used in the experiment, the amount of iron oxide and magnesia, and the general denseness of the clay as shown by the absence of stones, may be the causes of its want of growth and its poor feeding properties.

ANALYSES OF SOILS.

RESULTS IN AIR-DRIED SOILS.

	Boon.	Legerwood		Park Mains		Kippo	Drumtian	Sunderland.	
		Black Hill.	Weer's Field.	Gateside Field.	Moor Park.			Soil	Subsoil
Organic matter	10 9	14·9	15·65	9 35	9·10	6·95	29·4	25 3	21·27
H_2O	2·50	1·62	2·15	4·60	4·50	2·70	6·70	5·5	4·72
N	·20	·28	·18	·14	·17	·13	·25	·28	·23
Stones	9·78	55·13	4·89	8·71	27·72	5·17	1·27	39·72	62·86

NITRIC ACID SOLUTION (Strong-boiling).

P_2O_5	·12	·16	·10	·12	·11	·10	·11	·18	·21
Fe_2O_3	1·00	2·98	1·65	1 52	3 33	2 63	4·61	2 56	3·40
Al_2O_3	·86	1·85	5·09	1·83	1 27	2·14	6·40	1 85	3·21
CaO	·20	·38	·27	·35	·25	·41	·38	·37	·26
MgO	·59	·46	·65	·23	·18	·22	·83	·43	·50
K_2O	·07	·13	·12	·03	·05	·06	·15	·29	·11

HYDROCHLORIC ACID SOLUTION—Sp. Gr. 1·15=30 %, 48 hours in the cold.

SiO_2	·003	·006	·007	·005	·005	·003	·012	·008	...
P_2O_5	·06	·07	·07	·08	·06	·06	·07	·14	...
Fe_2O_3	·66	2·84	1·75	1·92	3·38	2·34	4·84	2 70	...
Al_2O_3	·73	1·71	1·62	·74	1·32	1·16	3·13	1·51	...
CaO	·16	·28	·10	·27	·05	·16	·45	·40	..
MgO	·14	·04	·05	·04	·024	·02	·45	·18	...
K_2O	·02	·04	·04	·01	·03	·006	·26	·06	...

CITRIC ACID SOLUTION—1 %, 7 days in the cold.

P_2O_5	·032	·028	·021	·024	·010	·017	·016	·025	028
K_2O	·0017	·013	·008	·007	·021	·008	·012	·015	·009

At Kippo the results are quite what might be expected from the soil analysis. At some of the other places the usual anomalies occur. For instance, the analyses would indicate that the manures should be of more value on the Gateside field at Park Mains than on the Moor park, whereas the latter has shown excellent results from the dressings of slag and kainit, and the former none.

At Boon the amount of phosphate, citric soluble, was greater than at any of the other places, and the quantity of potash found was lower than most, whereas the experiment shows that phosphate in the shape of slag has done a great deal of good, but that potash in the shape of kainit has done harm.

I think the general lessons which may be learned from this experiment are:—

1. That on clay soils overlying strong clay or tilly subsoils, where the grasses are poorly eaten and clovers sickly, slag may be expected to do good. Exception must be made to this in cases where, as often happens when agrostis is very predominant, the sod is very dense and the roots thick and matted.
2. Where the soil is lighter and the subsoil gravelly, the wise course would be to experiment on a limited area before going to much expense in the purchase of slag as a top-dressing.
3. On moory, mossy, and generally on black-topped land, slag seems a most useful agent, and it is probable that a little kainit should be added.
4. It would seem that in every case it is advisable to experiment in a small way with kainit before applying it to a large area of grass-land.
5. When the grasses are very thick and the roots practically occupy the soil, it is doubtful if any manuring will pay. The cases at St Colme's and Langburnshiels, and the moorland plot at Boon, may be taken as examples of this.

I do not think that we have learned all that such an experiment as this is fitted to teach, and I think some of the plots should be watched for a time, and other experiments might be instituted to clear up some doubtful points.

NITROGENOUS MANURES FOR TURNIPS.

By R. Patrick Wright, F.H.A.S., F.R.S.E., Professor of Agriculture in the West of Scotland Agricultural College.

In the 'Transactions of the Highland and Agricultural Society' for the year 1886, the late Dr A. P. Aitken, the distinguished chemist to the Society, published a summary of the results obtained in the series of experiments on the manuring of farm crops conducted by him at the Society's stations, of which annual reports had appeared in preceding volumes of the 'Transactions.' These experiments formed the most complete and reliable series that had up to that time been made in Scotland on the manuring of farm crops, and Dr Aitken's summary of the results, along with the detailed reports on which it was based, constitute the most important contribution made by Scotland in the last century to the growing science of Agricultural Chemistry. Summary and reports alike are characterised by a mastery of detail, a comprehensiveness of outlook, a keenness of insight, and a balance and soundness of judgment which can neither be over-praised nor excelled. Numerous as have been the manurial experiments carried out since that time in England and in Scotland, they have, except on some points of minor importance, only confirmed the main conclusions drawn by Dr Aitken from much less complete data, and they have thus established his reputation as an investigator of signal acuteness and reliability.

The experiments designed and conducted by the present writer on the manuring of turnips, first in connection with the Glasgow and West of Scotland Technical College, and subsequently with the West of Scotland Agricultural College, were, in the first instance, based on those of Dr Aitken; but they were intended not only to submit his conclusions to the test of further farm experiments, but also to throw light on additional problems of turnip manuring which had not come under the scope of Dr Aitken's investigations, but which were nevertheless of much practical importance to farmers.

In the manuring of turnips, as of other crops, three classes of artificial manures, apart from or in addition to farmyard manure, may be employed—viz., nitrogenous manures, phosphatic manures, and potassic manures. The action and effects of all these classes of manures have been made the subject of extensive experiments by the present writer during the past twelve years, and full details of the methods adopted and of the results achieved are contained in successive bulletins that have been issued from time to time by the West of Scotland Agricultural College. In the present brief paper it is proposed to give a summary of the results relating to the nitrogenous manures only.

Nitrogenous Manures.

The only nitrogenous manures which were regarded as of sufficient general utility and importance to be included in the West of Scotland experiments were nitrate of soda and sulphate of ammonia. These and other manures supplying nitrogen had also been employed in the Highland and Agricultural Society's experiments, but the conditions under which they were tried on the turnip crop made the results of somewhat doubtful application in practical farming, and the scheme of experiments did not indeed afford all the information required by a farmer who proposed to use these manures on his turnips. It was by no means certain in any case that the effects produced by these manures on two stations in the Lothians would also be obtained in the wetter climate of the Western counties. Moreover, the quantities of these manures used in the Highland and Agricultural Society's trials, amounting to an application of 40 lb. nitrogen per acre, or approximately 2 cwt. sulphate of ammonia or 2½ cwt. nitrate of soda, were much larger than are usually given to the turnip crop in Scotland.

The two manures also, as applied on plots 13 and 14 of the Highland and Agricultural Society's experiments, were not employed under precisely similar conditions, for while nitrogen was given in equal quantities to the two plots, and while they received also the same amount and kind of phosphatic manuring, the potash used on the two plots was not quite the same. It was applied to one plot in the form of sulphate of potash and to the other in the form of muriate of potash, in equal quantities of potash (K_2O) indeed, but in a different chemical combination and with a difference in the total amount applied of the potash salts and their impurities.

Nor were the Highland and Agricultural Society's experiments with these two manures quite satisfactory in other respects, for in 1878 the turnip crop, owing to the unfavourable character of the season, was a comparative failure, while in 1882, when the turnip crop was good and the experiments otherwise successful, the sulphate of ammonia and the nitrate of soda were both applied to the crop as top-dressings about a month after the sowing of the seed—a time and method of application now known to be unsuitable for both manures.

The experiments made on the turnip crop in the West of Scotland with these two manures were designed to furnish information on the following points:—

1. On the relative efficacy and absolute amount of increase of crop produced by either or both of them, and on the profit or loss accruing from their inclusion in a turnip manure.

2. On their efficacy when applied in combination instead of separately.

3. On the best time of applying nitrate of soda. (I was regarded as established that sulphate of ammonia should be applied in the drills before the sowing of the seed.)

These points may be taken in order:—

1. *The Relative Efficacy and Absolute Increase in the Turnip Crop produced by Nitrate of Soda and Sulphate of Ammonia.*

Experiments on these points were carried out in the years 1893, 1894, 1895, and 1896. In the first three of these years the nitrogenous manures were given along with superphosphate only, applied at the rate every year of 6 cwt. per acre. The nitrate of soda was applied throughout at the rate of 1 cwt. per acre as a top-dressing after the plants had been thinned, while the sulphate of ammonia was given in the drills along with the superphosphate just before the sowing of the seed, in quantity containing the same amount of nitrogen as was supplied in the 1 cwt. nitrate of soda, which was approximately ¾ cwt. sulphate of ammonia.

The results in the three years were as follows:—

NITRATE OF SODA *v.* SULPHATE OF AMMONIA IN 1893-95.

Manures applied per acre annually	6 cwt. Superphosphate			6 cwt Superphosphate, 1 cwt. Nitrate of Soda			6 cwt Superphosphate, * Sulphate of Ammonia		
Year.	Produce roots per acre.			Produce roots per acre			Produce roots per acre.		
	tons	cwt.	qr	tons	cwt	qr.	tons	cwt.	qr.
1893 (Average of 12 farms).	24	14	0	24	18	0	23	11	0
1894 (Average of 15 farms).	18	9	0	20	1	3	20	15	1
1895 (Average of 34 farms).	15	4	0	15	15	1	16	2	1
3)	58	7	0	60	15	0	60	8	2
Average . .	19	9	0	20	5	0	20	2	3

* Containing nitrogen equal to that contained in 1 cwt. nitrate of soda.

When the returns for the whole three years are taken into account, it appears that nitrate of soda and sulphate of ammonia exercised an almost equal effect and produced very nearly the same increase of crop. If, however, the returns be examined separately, it will be seen that nitrate of soda proved itself to be considerably the better manure in 1893, while both in 1894 and in 1895 the advantage lay with the sulphate of ammonia. It is quite apparent from the returns that the total amount of effect produced by these manures varies every year according to the character of the season, and that their relative efficacy also varies in a similar manner.

Both manures proved least effective in 1893, and when on several farms the nitrogenous manures seemed to cause an actual reduction of crop, sulphate of ammonia gave the worse results. Both gave their largest increases in 1894, and sulphate of ammonia produced considerably larger crops than nitrate of soda. In 1895 sulphate of ammonia again gave a heavier yield than nitrate of soda, but only to a moderate degree, while the increases produced by both these manures were only about one-third of what they gave in 1894. In the latter year the increases produced by both manures were highly profitable, while in 1893 they were just as clearly unprofitable, and in 1894 it is open to doubt whether the returns were or were not sufficient to repay the cost of the manures.

Plainly, however, the returns from these manures vary so much from year to year that no definite conclusion as to the economy of employing them could be safely drawn from the results of any single year's trials. But if the averages of the three years be taken it will be seen that 1 cwt. nitrate of soda gave an increase of 16 cwt. roots per acre, which, if it could be considered along with some increase of tops to repay the cost of the manure, was not sufficient, even if the crop were estimated at a high price, to give any profit on the expenditure incurred. While this is true on the average, it has to be kept in mind, however, that there were wide variations in the returns from the different farms; and that while on many of them the nitrogenous manures proved ineffective, and therefore unprofitable, on many others they gave large and very profitable increases of crop, and their omission from the turnip manure would have considerably reduced both yields and profits.

In these three years' experiments it is to be noted, however, that the manures applied contained no potash, and were therefore incomplete, and that the full action of the nitrogenous manures was probably not obtained through a deficiency in the soil of a readily available supply of that important ingredient. Moreover, it will be subsequently seen that the nitrogenous manures employed in these experiments were not applied in the most effective manner.

The Experiments of 1896.

The experiments of 1896 on the turnip crop were designed by Mr James Hendrick, now the consulting chemist of the Society, and its objects being different, nitrate of soda was the only nitrogenous manure employed in it. It shed no light, therefore, on the value of that manure as compared with sulphate of ammonia, but as it was applied on one plot along with phosphates and potash, it afforded some evidence of the increase of crop produced by it when given as a constituent of a complete manure.

The experiments were carried out on sixteen farms, and on one plot basic slag and sulphate of potash were given, the former at the rate of 634 lb. per acre and the latter at the rate of 1 cwt. per acre. On another plot the same phosphates and potash were given, with the addition of 1 cwt. nitrate of soda, applied, as in previous years, as a top-dressing after the thinning of the young plants. The average produce on all the farms on the plot which received no nitrate of soda was 19 tons 7 cwt. 2 qr., while on that which received the same phosphatic and potassic manures with the addition of nitrate of soda, the yield amounted to 22 tons 7 cwt. 3 qr. This was an increase of 2 tons 19 cwt. 3 qr. roots for 1 cwt. nitrate of soda, which was a much more profitable return than had been obtained in any previous year.

There was no evidence in the results from the other plots to indicate that this increased effect could be attributed in any marked degree to the character of the season, and the more probable explanation is that the greater efficacy of the nitrate of soda was due to the fact that potash as well as phosphate was given in the manure. But even were the increase to be attributed wholly to the character of the season, the average increase of the four years taken together would then make a figure sufficiently large to render certainly profitable a return which could only be regarded previously as very doubtfully so. For while on the average of the first three years, including those of 1893, when the nitrogenous manures proved so surprisingly ineffective, the increase produced by 1 cwt. nitrate of soda amounted to 16 cwt. roots only, when the four years' returns are taken the average return for 1 cwt. nitrate of soda is found to have been 24½ cwt. roots in addition to an increased yield of tops. The true inference therefore seems to be that nitrogenous manures cannot produce their full effects when the crop is not sufficiently supplied with phosphates and potash, and that the increases given by them, when one or other of these substances is deficient or awanting, must be regarded as showing only partially what these manures are capable of doing.

Experiments of 1897.

In the experiments of 1897 complete manures containing nitrogen, phosphoric acid, and potash were applied on all the plots, and they furnished no further evidence therefore as to the total amount of increase of crop which nitrogenous manures were capable of producing. But they supplied additional evidence as to the comparative efficacy of the two leading nitrogenous manures. The experiments were successfully carried out on eleven farms, and the figures given in the following table represent the average of the returns sent in. Two separate comparisons of nitrate of soda and sulphate of ammonia were made, in one of which the potash constituent of the manure was given in the form of kainit, and in the other in the form of sulphate of potash of 80 per cent purity.

NITRATE OF SODA *v.* SULPHATE OF AMMONIA IN 1897.

No. of plot.	Manures applied per acre.	Average produce of roots per acre.			
		Nitrate plots.		Ammonia plots.	
		tons	cwt.	tons	cwt.
1	102 lb. nitrate of soda with superphosphate and sulphate of potash	21	0	...	
2	71¼ lb.* sulphate of ammonia with superphosphate and sulphate of potash	...		21	4½
3	102 lb. nitrate of soda with superphosphate and kainit . .	21	14	...	
5	71¼ lb. sulphate of ammonia with superphosphate and kainit .	...		21	6¾
		42	14	42	11¼

Taken as a whole these results again showed a notable equality in the action of nitrate of soda and of sulphate of ammonia when applied in equivalent quantities of nitrogen, with a slight advantage in favour of nitrate of soda. But it is apparent that their action was affected in some degree by the special form of the potash manure with which they were given. Given with kainit the nitrate of soda proved distinctly the more effective of the two manures, while when sulphate of potash was substituted for the kainit in equivalent quantity of potash, the reverse effect was obtained, though in this case the difference between the two nitrogenous manures was less marked. But these results showed that in all comparisons between the relative effects produced by these manures account must be taken of the particular kinds of potassic and phosphatic manures given with them.

Experiments of 1899.

In a fresh series of experiments commenced in 1899 the inquiry into the best method of supplying nitrogenous manures to the turnip crop proceeded a stage further. Previously sulphate of ammonia and nitrate of soda had been applied as in ordinary farm practice, the one in the drills and the other as a top-dressing, the common belief being that if nitrate of soda were given in the drills much of it would be washed away by rain before the plant-roots could come into contact with it. It was decided, however, in 1899 to submit this commonly accepted theory to the test of actual trial, and accordingly in the experiments of that year nitrate of soda was applied on one plot wholly as a top-dressing and on another wholly in the drills. Some hesitation was felt in trying a combination of these methods, because of the practical difficulty and trouble involved in applying the manure in very small quantities; but it was finally decided to include a plot on which half the nitrate of soda should be given in the drills and the other half applied as a top-dressing on the growing plants. Sulphate of ammonia was given to another plot in the drills in the usual fashion; but on still another the two manures were combined, the half quantity of sulphate of ammonia being given in the drills, and the half quantity of nitrate of soda applied as a top-dressing after the thinning of the young plants.

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* Containing nitrogen equal to that contained in 102 lb. nitrate of soda.

The experiments were successfully completed on thirteen farms, and the figures quoted in the undernoted extract from the tables give the average results obtained from them.

EFFECTS OF NITROGENOUS MANURES IN 1899.

No of plot.	Manures applied.	Produce of roots per acre. (Average of 13 farms.)	
	All the plots received per acre 3 cwt. Superphosphate, 342 lb. Basic Slag, and 3 cwt. Kainit in addition to	Produce per acre.	
		tons	cwt.
1	1 cwt. nitrate of soda applied wholly as a top-dressing	16	3¼
2	1 cwt. nitrate of soda applied wholly in the drills	17	3¼
3	1 cwt. nitrate of soda applied half in the drills and half as a top-dressing	17	15¾
4	88 lb. sulphate of ammonia applied in the drills*	17	8¾
5	44 lb. sulphate of ammonia in the drills and ½ cwt. nitrate of soda as a top-dressing	17	11¼

* Supplying nitrogen equal to that contained in 1 cwt. nitrate of soda.

The experiments of 1899 were unfortunately carried out under conditions which made the average results not entirely reliable. The season was of an abnormal character and proved to be a very unfavourable one for the turnip crop. On a large proportion of the farms the experiments were an entire failure, and on those that were completed there were not a few contradictory results. Much stress could not therefore be laid on such comparatively small differences of yield of crop as showed themselves on plots 3, 4, and 5. But one result stood out conspicuously in the returns, and that was the failure of nitrate of soda applied wholly as a top-dressing to produce a crop nearly equal to that obtained where the nitrate was given wholly or partly in the drills. No accidental irregularity could account for such a marked difference in favour of the application of the nitrate in the drills, which was not only shown in the average returns of all the farms, but which was equally apparent on the greater number of them.

But even in this year, which was evidently favourable to the drill sowing of the manure as compared with top-dressing, the heaviest crops were grown on plot 3, where only half the nitrate of soda was given in the drills and the remainder was reserved for later application as a top-dressing. It seemed from this result that a half cwt. nitrate supplied all the nitrogen that the young plants required during the early stages of their growth, and that when the whole cwt. was given in the drills part of it at any rate got washed away and lost before the plants were able to utilise it wholly. But when the half was reserved for a top-dressing, the plants, having then in great part utilised the first ½ cwt. given, were able to make use of the second, and through the development of their roots in the soil prior to its application were able to seize hold of it as it was washed down, and to prevent any of that loss through drainage which probably was incurred in some degree when the whole of the nitrate was given in the drills.

Experiments of 1900.

On account of the abnormal character of the weather of 1899 it was decided to make the turnip experiment of 1900 an exact repetition of that of the previous year. The experiment was successfully carried out on thirteen farms, under weather conditions as favourable to the turnip crop as in the previous year they had been the reverse. From the beginning to the end of the season the crop made a healthy growth, and the final production of roots was on the average nearly one-third higher than in 1899. In the latter year, on the most productive plots, the average crop fell short of 18 tons per acre, whereas in 1900 the average yield of several of the plots exceeded 23 tons. The figures given in the undernoted table represent the average yields of thirteen farms, and side by side with them are repeated for convenience of comparison the average returns of 1899 from plots manured throughout in exactly the same manner.

EFFECTS OF NITROGENOUS MANURES IN 1899 AND 1900.

No. of plot.	Manures applied.	Produce of roots per acre.			
	All the plots received per acre 3 cwt. Superphosphate, 342 lb. Basic Slag, and 3 cwt Kainit in addition to	Average of 13 farms in 1899.		Average of 13 farms in 1900.	
		tons	cwt	tons	cwt.
1	1 cwt. nitrate of soda applied wholly as a top-dressing . .	16	3¼	22	17½
2	1 cwt. nitrate of soda applied wholly in the drills . .	17	3¼	23	13
3	1 cwt. nitrate of soda applied half in the drills and half as a top-dressing	17	15¾	23	19¾
4	88 lb. sulphate of ammonia applied in the drills*. . .	17	8¾	23	11½
5	44 lb. sulphate of ammonia in the drills and ½ cwt. nitrate of soda as a top-dressing . . .	17	11¼	24	4

* Supplying nitrogen equal to that contained in 1 cwt. nitrate of soda.

If attention be confined in the first instance to plots 1, 2, and 3 of the table, it will be seen that, widely different in character as the two seasons were, the results obtained from the diverse methods of employing nitrate of soda were the same in 1900 as they had been in 1899. In both seasons alike nitrate of soda applied wholly as a top-dressing to the growing plants gave smaller yields of crops than when it was given wholly in the drills, while still better crops were obtained when one-half of the nitrate was given in the drills and the other half applied as a top-dressing. The differences in the yields produced by the several methods of application were indeed somewhat less in 1900 than in 1899, but they were exactly similar in kind. It was therefore made clear that the inferior results obtained from the application of the nitrate of soda as a top-dressing in 1899 could not be entirely accounted for by the abnornal character of the season, though the amount of the difference was no doubt affected in some degree by that variation in the conditions.

In the light of these results the question of the comparative efficacy of nitrate of soda and sulphate of ammonia assumed a new aspect. In the returns obtained in the three years 1893-95, it had been seen that nitrate of soda applied wholly as a top-dressing and sulphate of ammonia given in the drills produced on the average almost an equal effect on the crop, though with variations every year, according as the weather conditions proved more or less favourable to the one or the other manure. In 1900, tested by the same comparison, the season was evidently favourable to the action of sulphate of ammonia, for the crop on the plot to which it was applied amounted to 23 tons 11½ cwt. per acre, whereas on the plot which received the nitrate wholly as a top-dressing the crop amounted to 22 tons 17½ cwt. only, or a difference of 14 cwt. in favour of the sulphate of ammonia. But when the nitrate was applied wholly in the drills, it proved in 1899 only a little less effective than sulphate of ammonia, and in the more reliable results of 1900 it proved to be slightly more effective, giving a crop of 23 tons 13 cwt. But when the nitrate was applied half in the drills and half as a top-dressing, in both 1899 and 1900 it showed a distinct though not a great superiority over sulphate of ammonia, and gave in both years larger crops. These two years' results, therefore, seemed to prove that the supposed general equality, with occasional superiority, of sulphate of ammonia to nitrate of soda as the nitrogenous manure for turnips, was attributable to the employment of nitrate of soda in the least effective manner as a top-dressing, and that when it was employed in a more suitable manner it proved itself to be distinctly and uniformly the better manure.

The heaviest crop, however, in the experiments of 1900 was grown by neither of these methods, but was obtained from plot 5, to which a combination of the two manures, sulphate of ammonia and nitrate of soda, had been given, the former in the drills and the latter as a top-dressing. In 1899 this combination was also tried, and while it proved superior to the use of sulphate of ammonia alone, or to nitrate of soda applied either wholly in the drills or wholly as a top-dressing, it failed to produce as large a crop as nitrate of soda alone when applied half in the drills and half as a top-dressing. But in the returns of the 1900 experiments, on which greater reliance can be placed, while the method of applying the nitrate in two dressings again proved very successful, it was nevertheless less effective than the combination of sulphate of ammonia with nitrate of soda, which produced a crop larger by 12½ cwt. per acre than that given by sulphate of ammonia alone, and 4¼ cwt. larger than that given by nitrate of soda applied in divided doses in the drills and as a top-dressing.

These results were so important that it was considered necessary to repeat the experiments once more in order to obtain further confirmation.

The Experiments of 1901.

Accordingly, in the experiments of 1901, while changes were made in the other manures employed, the same series of comparisons of nitrate of soda and sulphate of ammonia were continued. In that year the experiments were carried out on twenty-one farms in all, and the returns given represent the average of that number. The season was of an intermediate or moderately suitable character, neither so unfavourable to the turnip crop as that of 1899 nor so very favourable as that of 1900. This was shown in the average crops got from the unmanured plots, which in 1899 amounted to 10½ tons per acre, in 1900 to 16¼ tons, and in 1901 to 12½ tons. The three seasons were therefore fairly representative of the variations that occur constantly in our climate, and the average results obtained in them may be regarded with some certainty as applicable to the average conditions that may be expected to prevail throughout a long series of years.

EFFECTS OF NITROGENOUS MANURES IN 1901.

No. of plot.	Manures applied.	Produce of roots per acre. (Average of 21 farms.)	
	All the plots received per acre 6 cwt. Superphosphate and 4 cwt. Kainit in addition to	tons	cwt.
1	1 cwt. nitrate of soda applied as a top-dressing	21	7½
2	1 cwt. nitrate of soda applied in the drills	21	9¾
3	½ cwt. nitrate of soda in the drills and ½ cwt. nitrate of soda top-dressed	22	5
4	89 lb. sulphate of ammonia in the drills*	22	14¾
5	44½ lb. sulphate of ammonia in the drills and ½ cwt. nitrate of soda top-dressed	22	16

* Containing nitrogen equal to that applied in 1 cwt. nitrate of soda.

It will be seen from the returns of the first three plots given above that for the third year in succession nitrate of soda applied wholly as a top-dressing failed to produce as large a crop as nitrate given wholly in the drills; and though the amount of difference shown in the result in 1901 was so small as to be negligible in itself, it was important as a confirmation of the inference drawn from the more marked differences of the previous two years. But again, also for the third time, it was found that the largest crops were obtained when the dressing of the nitrate was divided, and one-half given in the drills while the other half was applied as a top-dressing. The superiority of this latter method was even more markedly manifested in 1901 than in 1899 or in 1900.

The conclusion is therefore inevitable, that of the three possible methods of applying nitrate of soda to the turnip crop, the one most extensively practised and most commonly recommended, of applying the nitrate of soda wholly as a top-dressing, is distinctly the least effective, and that the application of the manure wholly in the drills, though not the best method, is nevertheless more successful. The practice of applying nitrate as a top-dressing has been always advocated on the ground that soils have no power to retain nitrate of soda, and that if it be put in the soil before the roots of plants are ready to take it up it will be in great part washed into the drains and lost. Yet the test of actual trial has now conclusively shown that better results are obtained from the drill application than from the top-dressing. It would therefore appear either that the loss incurred through the washing of the nitrate into the drains is less than was feared, or that there are disadvantages attending the method of top-dressing which are even greater.

Why Nitrate in Drills is better than as a Top-Dressing.

There are some circumstances which seem to show that the danger of loss of nitrates being incurred when they are applied in the drills to the turnip crop has been somewhat exaggerated. First of all, it has not perhaps been sufficiently considered that in the latter half of May, when turnips are generally sown in the West of Scotland, the ground is usually in a comparatively dry condition. This arises partly from the fact that the rainfall in the spring months of the year is usually much lighter than in the autumn, while in the warm spring days of April and May much moisture is evaporated from the soils into the atmosphere. The amount of evaporation is largely increased where the land is being broken up by cultivation, and it is greatest of all in the case of land that is being prepared for turnips, which is always subjected to a complete series of cleaning and tillage operations. The final operation in the series — viz., that of throwing the land into ridges—is the means of exposing a much greater surface area of the soil to the action of evaporation, and it is on account of the great drying of the land that follows the making of the ridges that the practice prevails in dry districts in England of sowing turnips on the flat. Consequently, both at and after the date of turnip sowing the land is in such a dry condition that it is capable of absorbing a considerable amount of moisture; and, save in the case of a very heavy and continuous rainfall, the greater part of the rain that falls during the early growth of the turnip crop is disposed of by absorption or by evaporation from the soil, or by transpiration through the leaves of growing plants, and but little of it finds its way into the drains. Moreover, the nitrate sown in the centre of the ridges and between the open furrows, through which any excess of rain will most readily sink, is in some degree protected from being washed down into the subsoil. For these reasons it seems, therefore, that the risk of loss being incurred through the application of nitrate in the drills is by no means so great as has been very generally assumed.

On the other hand, there are serious disadvantages in deferring the application of the nitrate till the turnips have passed the thinning stage. The young plants grow with less rapidity and vigour in the absence of a sufficient supply of nitrates at their roots, while should the weather remain dry for a time after the nitrate has been applied as a top-dressing, as not infrequently happens, it may lie uselessly on the surface for many weeks, and may only begin to produce an effect when the season of turnip growth has in great part gone past.

Sulphate of Ammonia v. *Nitrate of Soda.*

When we turn to the results of plots 4 and 5, on which sulphate of ammonia was applied alone and in combination with nitrate of soda, we find that the season was again one very favourable to sulphate of ammonia as compared with nitrate of soda. For not only did the crop grown with sulphate of ammonia as the sole nitrogenous manure prove larger than that grown with nitrate of soda applied as a top-dressing, but it was substantially larger also on the other plots on which nitrate of soda was wholly given in the drills, or given partly in the drills and partly as a top-dressing. The marked superiority of sulphate of ammonia in 1901 admits of easy explanation. While the season was, on the whole, moderately favourable to the turnip crop, it was not favourable throughout the whole growing season. The summer was generally too dry, bright, and warm for the turnip, and up to the end of September it remained very doubtful whether the yield of the crop would not fall considerably short of an average. But the weather of the autumn proved particularly suitable for the growth of the plant. The temperature was mild and the rainfall moderate, and there were no severe frosts to bring growth to a premature end.

The crop accordingly steadily developed into a satisfactory size and yield. But this late development of the bulbs was specially adapted to bring the action of sulphate of ammonia into play. Nitrate of soda rather favours the growth of the crop early in the season, and it is less capable of maintaining its progress in the autumn months. This may be of little importance in seasons when the summer weather favours the rapid growth of the crop, and when it succeeds in attaining almost to a full yield by the end of September; but when, as happened in 1901, the growth of the crop is largely made in the autumn months, a decided advantage is given to a manure like sulphate of ammonia, of which the action is slower and more continuous than that of nitrate of soda.

But a truer estimate of the relative value of these two manures may be made by taking the whole results of the three years' experiments of 1889, 1900, and 1901, in which they were used under exactly similar conditions, as were those applied in the three years 1893, 1894, and 1895, of which a summary has been already given.

NITRATE OF SODA *v.* SULPHATE OF AMMONIA IN 1899, 1900, 1901.

Manures applied per acre.	1 cwt. nitrate of soda as a top-dressing with phosphatic and potassic manures.	1 cwt nitrate of soda wholly in the drills with phosphatic and potassic manures.	1 cwt nitrate of soda applied half in the drills and half as a top-dressing with phosphatic and potassic manures.	58 lb sulphate of ammonia given in the drills (89 lb in 1901) with phosphatic and potassic manures
Year.	Produce of roots per acre.	Produce of roots per acre.	Produce of roots per acre	Produce of roots per acre.
	tons cwt qr.	tons cwt. qr	tons cwt. qr.	tons cwt qr.
1899 (Average of 13 farms)	16 3 1	17 3 1	17 15 3	17 8 3
1900 (Average of 13 farms)	22 17 2	23 13 0	23 19 3	23 11 2
1901 (Average of 21 farms)	21 7 2	21 9 3	22 5 0	22 14 3
Total .	60 8 1	62 6 0	64 0 2	63 15 0

The results of the various methods of applying nitrate of soda alone have been discussed in the consideration of the returns of 1901, and it need only be further pointed out that the results of the three years' experiments, whether taken separately or together, corroborate each other in showing that much the most effective method is to apply it half in the drills and half as a top-dressing. They also show quite decisively, on the whole, that when applied in this way nitrate of soda is, on the average of years, a more effective manure for the turnip crop than sulphate of ammonia. When applied solely as a top-dressing the inferiority of the nitrate was manifest; when applied in the drills it gave in one season out of three a larger crop than sulphate of ammonia, and on the average of all the years proved itself to be only slightly inferior; but when given in divided dressings, it succeeded in showing a slight but sufficiently clear superiority. That this superiority was not manifested in 1901 as well as in 1899 and 1900 was evidently due to the special suitableness for sulphate of ammonia of the weather of the season. Nevertheless, in spite of that fact, it will be seen by referring to the returns of plot 5 that the heaviest crop after all was not given by sulphate of ammonia alone, but by its combination with nitrate of soda, the one being given in the drills and the other as a top-dressing. The difference indeed in 1901 was a very small one on the average of all the farms, but the fact that it did occur in a season peculiarly favourable to sulphate of ammonia adds the strongest confirmation to the results previously obtained.

The greater efficacy of the latter method will, however, be best seen if the returns for the three years in which it was tried be considered together.

THE MOST EFFECTIVE METHOD OF APPLYING NITROGENOUS MANURES TO TURNIPS.

Manures applied per acre.	1 cwt. nitrate of soda applied half in the drills and half as a top-dressing with phosphatic and potassic manures.			88 lb. sulphate of ammonia given in the drills (89 lb. in 1901) with phosphatic and potassic manures.			44 lb. sulphate of ammonia (44½ lb. in 1901) given in the drills and ½ cwt. nitrate of soda applied as a top-dressing with phosphatic and potassic manures.		
Year.	Produce of roots per acre.			Produce of roots per acre.			Produce of roots per acre.		
	tons	cwt.	qr.	tons	cwt.	qr.	tons	cwt.	qr.
1899 (Average of 13 farms)	17	15	3	17	8	3	17	11	1
1900 (Average of 13 farms)	23	19	3	23	11	2	24	4	0
1901 (Average of 21 farms)	22	5	0	22	14	3	22	16	0
Total . . .	64	0	2	63	15	0	64	11	1

In these figures it is shown that the effects obtained from the application of sulphate of ammonia alone, and also from the most successful method of employing nitrate of soda, were both surpassed in efficacy by the combination of the two manures. The combined application not only gave the highest total amount of produce in the three years, but also the largest crops both in 1900 and in 1901. The difference on the average of the years was not great, but it was sufficient to be decisive. It seems, therefore, to be established by these results that the most effective method of applying these two nitrogenous manures to the turnip crop is to give them in combination in the manner shown. Both are relatively quick-acting manures, but in the one the action is immediate and is sooner over, while in the other the action commences somewhat later, but continues for a longer period. It is apparently to this union of the more immediate with the more prolonged action that the superior efficacy of the combination of nitrate of soda and sulphate of ammonia to any one of them used separately must be attributed.

Conclusions.

The conclusions that may be drawn from these experiments are as follows:—

1. That the application of nitrogenous manures, like nitrate of soda or sulphate of ammonia, in suitable quantity to the turnip crop in addition to phosphatic and potassic manures gives an increase of crop, but that unless these manures be employed with skill and judgment the return obtained may not be sufficient to repay the cost.
2. That the most effective method of applying nitrate of soda to the turnip crop is to give half the allotted quantity in the drills and to apply the remainder as a top-dressing after the thinning of the young plants.
3. That the nitrate applied wholly as a top-dressing is much less effective than when given wholly in the drills.
4. That sulphate of ammonia given in the drills produces larger crops than nitrate of soda given wholly in the drills or wholly as a top-dressing, but hardly so large as are produced by nitrate of soda given partly in the drills and partly as a top-dressing.
5. That the largest increases of crops are obtained by employing both manures, and by giving one-half of the nitrogenous manure in the drills as sulphate of ammonia, and the other half as a top-dressing in the form of nitrate of soda.

MILK INVESTIGATIONS AT GARFORTH, 1905.

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In Yorkshire, and generally throughout the north of England, it is the common practice to allow milking cows to remain at pasture day and night throughout the warmer half of the year, the period, that is, from April or May to October or November. During part or the whole of this period it is usually considered advisable to supplement the grazing by an allowance of "concentrated" food. The practice of individual farmers varies widely, however, in this latter respect.

Whilst some are of opinion that during the earlier stages, at least, of the pasturage season no supply of concentrated food is necessary to ensure maximum production of milk of good quality and the maintenance of the "condition" of the animals, others consider it necessary to supply concentrated food throughout the whole season, the ration being gradually increased as with the advancing season the pasturage becomes more and more scanty.

The necessity or otherwise for concentrated food during the earlier part of the grazing season will, of course, depend entirely on the quality of the pastures, and evidence based upon experiment is available to demonstrate that in some cases no appreciable improvement has been effected by the supply of such food for some time after the cows have been turned out to grass.[1]

Opinion is unanimous, however, as to the necessity for the supply of *some* additional food during the latter half of the season, but differs greatly as to the relative merits of different foods and the quantities which can be economically utilised.

The influence of the *nature* of the concentrated food has been subjected to considerable experimental investigation in recent years at various centres in this[2] and other countries. The results are, in the main, so uniformly in agreement that it is impossible to evade the conclusion that, provided certain conditions as to the minimum quantities and suitable proportions of nitrogenous and non-nitrogenous constituents in the food are fulfilled, the milk-production cannot be permanently affected to any extent worthy of practical consideration by varying the *nature* of the concentrated food supplied to cows when on pasture.

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[1] Experiments at the Cumberland and Westmoreland Farm School, Newton Rigg, have shown that no improvement is effected there either in quantity or quality of milk by giving additional food to cows when on grass up to the middle of July.

[2] For details of investigations at Garforth, *vide* Trans., 5th ser., 1901, vol. xiii. p. 218; 1902, vol. xiv. p 284; 1903, vol. xv. p. 135; 1904, vol. xvi. p. 268; 1905, vol. xvii. p. 296. Cp. also Speir, Trans., 5th ser., 1894, vol. vi. p. 83; 1896, vol. viii.; 1897, vol. ix.; Univ. Coll., Reading, 1903, 9th Ann. Rep., pp. 5-12; Durham College of Science Agric. Dep., 1903, 12th Ann. Rep., pp. 54-75; Robb, West of Scotland Agric. Coll. Bulletin, 1905.

The influence of the *amount* of this food on the milk-production has not been so widely investigated, however, and it is to the elucidation of this aspect of the feeding problem, therefore, that the writer has endeavoured to contribute in the experiment which forms the basis of the present communication.

Plan of Experiment.

For the purposes of the experiment ten cows (cf. pp. 112, 113) were selected from the dairy herd at the Manor Farm, Garforth (Experimental Farm of the University of Leeds and the Yorkshire Council for Agricultural Education).

From July 18 to October 9, 1905 (twelve weeks), samples were taken of the milk of each of these cows at every milking —with certain exceptions to be noted later (p. 113). These samples were analysed daily in the chemical laboratory at the farm, the methods of sampling and analysis being precisely those employed in previous years (*vide* Ingle, 'Trans.,' 1903, pp. 137-139).

The methods of sampling were frequently tested by drawing duplicate samples, and were found in every case to be thoroughly reliable.

Every precaution was taken, as in previous investigations, to ensure thoroughness and regularity in milking, and to render those conditions of experiment which were under control as uniform as possible,—all data likely to affect the milk records (*e.g.*, hours of milking, change of pasture, weather, periods of sexual excitement, &c.) being systematically recorded.

From the end of April onwards and throughout the whole of the experiment all the cows were at pasture day and night, being brought into the cow-house solely for the milkings—these commencing usually at about 6 A.M. and 3 P.M. respectively.

During the milkings each cow received an allowance of dry food, which until August 8 was identical in every case—viz., an intimate mixture of 2 *lb. of undecorticated and* 2 *lb. of decorticated cotton-seed-cake* in small fragments. These quantities represent the allowance per cow for the whole day, the mixture being given in two separate portions.

The experiment proper commenced on August 8, when, with the data obtained from the records of the preceding three weeks and the information available as to the age, weight, period of lactation, and other characteristics of each cow, it was possible to arrange them in two groups fairly comparable in most respects. Particulars of the cows and of the grouping adopted are given in Table I.

TABLE I.

GROUP I.

No. of Cow.	Age.	Weight on July 28			Weeks since calving, to July 18.	Daily average for Period I (July 18–August 7)		
						Milk yield.	Fat.	Solids-not-fat.
	Years.	cwt.	qr.	lb		lb.	Per cent.	Per cent.
2	5	10	3	0	12	29·0	3·35	8·8
9	8	12	3	6	19	31·1	3·3	8·7
14	8	12	1	10	13	33·5	3·3	9·0
16	5	11	3	20	93	24·0	3·6	9·4
23	7	11	0	0	69	31·6	3·45	8·9
Average per cow	6·6	11	3	2	41	29·8	3·37	8·95

GROUP II.

No. of Cow.	Age.	cwt.	qr.	lb	Weeks since calving, to July 18.	Milk yield.	Fat.	Solids-not-fat.
1	5	11	0	10	27	25·6	3·15	9·4
6	6	11	0	14	20	30·6	4·1	9·2
8	8	12	0	8	12	21·7	2·95	8·7
15	6	11	1	16	17	33·1	3·05	9·0
19	8	10	0	12	62	35·4	3·45	9·3
Average per cow	6·6	11	0	18	28	29·3	3·38	9·15

From August 8 to September 9 the cows of Group I. continued to receive the same allowance of dry food as heretofore (*vide*, p. 111), whilst those of Group II. received a gradually increased allowance of the decorticated cake, amounting by August 20 to 4 lb. per cow per day. No further increase beyond this amount was made in the case of this group during the remainder of the experiment.

After a three-weeks' comparison of the groups under these conditions, the allowance of decorticated cake to the cows of Group I. was gradually raised to 6 lb. per cow per day. Commencing on September 10 the increase was effected by September 19, and the experiment was continued for three weeks from that date.

The experiment thus comprised three main periods of three weeks each, during which no changes of feeding took place, and two transitional periods of 12 and 10 days respectively, during which the daily ration of one or other of the groups was gradually increased. This is indicated in the following schedule, in which, for convenience of reference, the general course of the experiment is summarised.

TABLE II.—NATURE AND AMOUNT OF DRY FOOD SUPPLIED DAILY PER COW TO EACH GROUP.

PERIOD.	GROUP I. (NOS. 2, 9, 14, 16, 23.)	GROUP II. (NOS. 1, 6, 8, 15, 19.)
I. July 18-Aug. 7 (3 weeks).	2 lb. undec. cotton-cake 2 " dec. "	As Group I.
FIRST TRANSITIONAL (12 days). Aug. 8-11	As in Period I. . . .	2 lb. undec. cotton-cake 2½ " dec. "
" 12-15		2 " undec. " 3 " dec. "
" 16-19		2 " undec. " 3½ " dec. "
II. Aug. 20-Sept. 9 (3 weeks).	As in Period I. . . .	2 lb. undec. cotton-cake 4 " dec. "
SECOND TRANSITIONAL (10 days). Sept. 10-12	2 lb. undec. cotton-cake 3 " dec. "	As in Period II.
" 13-15	2 " undec. " 4 " dec. "	
" 16-18	2 " undec. " 5 " dec. "	
III. Sept. 19-Oct. 9 (3 weeks).	2 lb. undec. cotton-cake 6 " dec. "	As in Period II.

By the end of Period II. the milk-yield in the case of cow 2 (Group II.) and cow 8 (Group I.) had become so small that it was considered inadvisable to include them further, so that during the subsequent stages of the experiment each group consisted of 4 cows only.

During the first transitional period separate samples of each cow's milk were not taken, but duplicate composite samples representing the total daily produce of each group were prepared by taking from the milk of each cow, by means of a narrow glass tube, a quantity proportional to the yield, these samples being then mixed together as required for the group samples. The agreement between the duplicates was in every case very close, and therefore the samples may be regarded as accurately representing the quality of the daily produce of each group. Owing to the fact that during this period considerable delay occurred in the analysis of the samples, the estimation of solids-not-fat was omitted. By the use of preservative in the form of a few drops of an ammoniacal solution of potassium bichromate the samples were, however, maintained in a condition admitting of accurate estimation of the butter-fat by the Gerber method.

Throughout the rest of the experiment separate samples were drawn from every milking of each cow and analysed.

The data obtained in the experiment are summarised in Tables III., IV., pp. 115, 116, which contain the mean daily results for each week and for each period of the experiment.

In view of the number of samples dealt with, it has been thought inadvisable to record the data obtained from each individual sample, but the range of variation is indicated by the maximal and minimal values included in the tables. The total yields of fat and of solids-not-fat, and the data concerning the mixed morning and evening milk, have been calculated from the milk-yields at each milking as recorded by the spring-balance, and the percentages of fat and of solids-not-fat as determined in the laboratory.

To facilitate the comparison of the records of the two groups throughout the experiment, the averages for consecutive periods of three days are contrasted graphically in figs. 1, 2, pp. 125, 126. The points representing the means are surrounded by circlets for convenience of identification, and are connected by straight lines in order that the general trend of the changes can be more readily traced. The data refer to the combined morning and evening results.

Results of Experiment.

On referring to the schedule on p. 113 (Table II.) it will be noted that whereas during Period I. both groups received identical treatment in every way, this was not the case in Periods II. and III., during which the treatment differed in one respect, but one only—viz., in the quantity of decorticated cotton-cake supplied. During Period II. the cows of Group II. received per head 2 lb. more of this cake daily than those of Group I., whilst during Period III. the conditions were reversed in this respect.

It should thus be possible to arrive at the effects of the increase of food-supply on the milk-secretion by comparing the records of the two groups during Periods II. and III.—due

TABLE III.—GROUP I. (NOS. 2, 4, 16, 23.)

RAGE WEIGHT PER COW (on July 28), wt. 3 qr. 2 lb.

MEAN DAILY RESUL

PERIOD.	Milk yield.		Fat.		Solids-not-fat.		Total yield of fat.		Total yield of solids-not-fat.		Mixed morning and evening milk.			REMARKS.
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	Yield.	Fat.	S-N-F.	
	lb.	lb.	%	%	%	%	lb.	lb.	lb.	lb.	lb.	%	%	
I. July 18–July 24	88·6	62·5	2·85	4·0	9·0	8·9	2·51	2·51	7·98	5·56	151·1	3·35	9·0	Received daily— 2 lb. undecorticated cotton-cake. 2 " decorticated " "
" 25– " 31	87·1	62·5	2·84	4·07	9·0	8·8	2·45	2·55	7·80	5·51	149·6	3·35	8·9	
Aug. 1–Aug. 7	86·5	60·6	2·95	4·21	8·9	8·9	2·55	2·55	7·72	5·43	147·1	3·45	8·9	
Daily average for whole of Period I. (3 weeks)	**87·40**	**61·92**	**2·88**	**4·09**	**8·95**	**8·90**	**2·513**	**2·533**	**7·833**	**5·499**	**149·32**	**3·37**	**8·95**	RATIO, A.M. : P.M. Yield, 1·41 : 1. Fat, %, 1 : 1·42.
1st transitional period, Aug. 8-19 (12 days)	80·2	59·3	...	...	...	...	...	...	...	...	139·5	3·57	...	...
II. Aug. 20–Aug. 26	76·6	54·0	2·89	4·41	8·7	8·7	2·21	2·38	6.70	4·72	130·6	3·50	8·7	Food as in Period I. Live-weight dec. (July 28-Sep. 9) 376 lb. Average per cow=75·2 lb.
" 27–Sept. 2	70·1	50·1	2·99	4·56	8·7	8·7	2·10	2·28	6·11	4·37	120·2	3·65	8·7	
Sept. 3– " 9	67·4	49·1	3·07	4·69	8·8	8·8	2·07	2·30	5·91	4·32	116·5	3·75	8·8	
Daily average for whole of Period II. (3 weeks)	**71·38**	**51·05**	**2·98**	**4·55**	**8·75**	**8·75**	**2·126**	**2·323**	**6·239**	**4·472**	**122·43**	**3·63**	**8·75**	RATIO, A.M. : P.M. Yield, 1·40 : 1. Fat, %, 1 : 1·53.
2nd transitional period, Sept. 10-18 (9 days)	53·6	37·8	3·38	4·92	8·9	8·9	1·815	1·866	4·761	3·380	91·5	4·00	8·9	...
III. Sept. 19-Sept. 25	50·7	37·5	3·30	4·74	8·9	9·0	1·67	1·80	4·54	3·36	88·2	3·95	8·95	Food as in Period II., with addition of 4 lb. decorticated cotton-cake daily. Cow No. 2 omitted. Live-weight inc. (Sept. 9-Oct. 9) 290 lb. Average per cow=72·5 lb.
" 26-Oct. 2	47·9	36·1	3·43	4·76	8·95	8·95	1·64	1·72	4·29	3·23	84·0	4·00	8·95	
Oct. 3- " 9	46·7	33·0	3·53	4·80	9·1	9·1	1·65	1·59	4·26	3·02	79·7	4·05	9·1	
Daily average for whole of Period III. (3 weeks)	**48·45**	**35·55**	**3·42**	**4·79**	**9·0**	**9·0**	**1·655**	**1·701**	**4·360**	**3·205**	**84·00**	**4·00**	**9·0**	RATIO, A.M. : P.M. Yield, 1·36 : 1 Fat, %, 1 : 1·40.
Highest value recorded	94·0	67·0	3·90	5·57	9·25	9·35	2·67	2·79	8·25	5·88	155·5	4·45	9·2	RATIO, A.M. : P.M. Yield, 1·54 : 1. Fat, %, 1 : 1·75.
Lowest value recorded	45·5	31·0	2·65	3·88	8·65	8·60	1·43	1·50	3·99	2·86	77·0	3·22	8·7	RATIO, A.M. : P.M. Yield, 1·20 : 1. Fat, %, 1 : 1·20.

TABLE IV.—GROUP II. (Nos. 1, 6, 8, 15, 19.)

AVERAGE WEIGHT PER COW (on July 28), 11 cwt. 0 qr. 18 lb.

MEAN DAILY RESULTS

Period.	Milk yield.		Fat.		Solids-not-fat.		Total yield of fat.		Total yield of solids-not fat.		Mixed morning and evening milk.			Remarks.
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	Yield.	Fat.	S-N-F.	
	lb.	lb.	%	%	%	%	lb.	lb.	lb.	lb.	lb.	%	%	
I. July 18–July 24	86·5	63·8	2·81	4·01	9·35	9·05	2·43	2·56	8·12	5·77	150·3	3·30	9·25	Received daily— 2 lb undecorticated cotton-cake. 2 " decorticated " "
I. " 25– " 31	83·2	62·9	2·73	4·22	9·15	8·95	2·27	2·65	7·61	5·63	146·1	3·35	9·05	
I. Aug. 1–Aug. 7	82·4	60·6	2·70	4·38	9·05	9·05	2·23	2·65	7·47	5·50	143·0	3·10	9·05	
Daily average for whole of Period I. (3 weeks)	**84·05**	**62·43**	**2·75**	**4·20**	**9·20**	**9·00**	**2·310**	**2·620**	**7·734**	**5·633**	**146·48**	**3·37**	**9·15**	RATIO, A.M. : P.M. Yield, 1·36 : 1. Fat, %, 1 : 1·52.
1st transitional period, Aug. 8-19 (12 days)	78·2	59·2	...	...	...	...	...	...	...	...	137.4	3·4	..	
II. Aug. 20-Aug. 26	74·2	54·3	2·92	4·62	8·85	8·8	2·17	2·51	6·58	4·78	128·5	3·65	8·85	Food as in Period I., with addition of 2 lb. decorticated cotton-cake daily. Live-weight dec. (July 28-Sep. 9) 62 lb. Average per cow=12·4 lb.
II. " 27-Sept. 2	71·3	52·7	2·93	4·63	8·85	8·8	2·09	2·44	6·32	4·65	124·0	3·65	8·85	
II. Sept. 3- " 9	68·3	49·0	3·10	4·94	8·9	8·8	2·12	2·42	6·07	4·31	117·3	3·85	8·85	
Daily average for whole of Period II. (3 weeks)	**71·26**	**52·00**	**2·98**	**4·73**	**8·85**	**8·80**	**2·126**	**2·456**	**6·325**	**4·580**	**123·26**	**3·72**	**8·85**	RATIO, A.M. : P.M. Yield, 1·37 : 1. Fat, %, 1 : 1·59.
2nd transitional period, Sept. 10-18 (9 days)	54·5	37·5	3·39	5·04	8·95	8·9	1·846	1·792	4·868	3·340	92·0	4·05	8·9	
III. Sept. 19-Sept. 25	49·9	35·4	3·49	4·91	8·95	9·0	1·74	1·74	4·47	3·19	85·3	4·10	9·0	Food as in Period II. Live-weight inc. (Sept. 9 Oct. 9) 216 lb. Average per cow=54 lbs.
III. " 26-Oct. 2	49·9	34·9	3·47	4·82	8·9	8·95	1·74	1·68	4·46	3·12	84·8	4·05	8·9	
III. Oct. 3- " 9	47·4	33·1	3·44	4·93	9·0	9·2	1·63	1·67	4·27	3·05	80·5	4·10	9·1	
Daily average for whole of Period III. (3 weeks)	**49·05**	**34·48**	**3·47**	**4·89**	**8·95**	**9·05**	**1·702**	**1·698**	**4·397**	**3·120**	**83·53**	**4·07**	**9·0**	RATIO, A.M. : P.M. Yield, 1·42 : 1. Fat, %, 1 : 1·41.
Highest value recorded	89	68·5	3·84	5·62	9·8	9·3	2·65	2·95	8·74	6·24	156	4·35	9·45	RATIO, A.M. : P.M. Yield, 1·73 : 1. Fat, %, 1 : 1·87.
Lowest value recorded	45	28	2·40	3·60	8·8	8·65	1·48	2·58	4·06	2·58	76·5	3·10	8·80	RATIO, A.M. : P.M. Yield, 1·21 : 1. Fat, %, 1 : 1·23.

allowance being made for the differences in productiveness of the two groups when receiving identical treatment, as revealed in the data obtained during Period I.

In making this comparison it is not necessary to consider the data obtained at the morning and evening milkings separately, the record for the whole day being sufficient for our purpose. The following table (Table V.), compiled from Tables III. and IV., will facilitate the comparison.

TABLE V.—Comparison of Total Production of each Group in the Three Main Periods of the Experiment.

(*a*) Comparison of Periods I. and II.

	Total Milk-Yield	Total Yield of Butter-fat.	Equal to Fat %.	Total Yield of Solids-not-fat.	Equal to Solids-not-fat %.	Gain (+) or Loss (–) of Live Weight during Period II.
	lb.	lb.	%	lb	%	lb
GROUP I.						
Period I.	3135·5	105·96	3·37	279·98	8·95	
Period II.	2571·0	93·43	3·63	224·94	8·75	
Absolute Increase (+) or Decrease (–) for Period II.	–564·5	–12·53	+0·26	–55·04	–0·20	–376
Percentage Increase or Decrease	–18·0	–11·8		–19·7		–5·7
GROUP II.						
Period I.	3076·0	103·53	3·38	280·71	9·15	
Period II.	2588·5	96·23	3·72	229·00	8·85	
Absolute Increase (+) or Decrease (–) for Period II.	–487·5	–7·30	+0·34	–51·71	–0·30	–62
Percentage Increase or Decrease	–15·8	–7·0		–18·4		–1·0
Percentage Gain (+) or Loss (–); (Group II.—Group I.)	+2·2	+4·8	+0·08	+1·3	–0·10	+4·7

(b) Comparison of Periods II. and III.

	Total Milk-Yield.	Total Yield of Butter-fat.	Equal to Fat %.	Total Yield of Solids-not-fat	Equal to Solids-not-fat %.	Gain (+) or Loss (−) of Live Weight during Period III
	lb.	lb.	%	lb.	%	lb.
GROUP I.						
*Period II. . . .	2204·0	80·72	3·66	194·38	8·82	
Period III. . . .	1764·0	70·47	4·00	158·87	9·01	
Absolute Increase (+) or Decrease (−) for Period III.	−440·0	−10·25	+0·34	−35·51	+0·19	+290
Percentage Increase or Decrease	−20·0	−12·7		−18·3		+5·4
GROUP II.						
*Period II. . . .	2255·0	84·72	3·76	201·83	8·95	
Period III. . . .	1754·0	71·40	4·07	157·86	9·00	
Absolute Increase (+) or Decrease (−) for Period III.	−501·0	−13·32	+0·31	−43·97	+0·05	+216
Percentage Increase or Decrease	−22·2	−15·7		−21·8		+4·4
Percentage Gain (Group I. — Group II.)	2·2	3·0	0·03	3·5	0·14	1·0

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* During Period III Nos. 2 and 8 were omitted. For the purposes of the comparison of Periods II. and III. the data obtained from these cows during Period II. have therefore been deducted from the totals for Period II given in Table V. (a)

From the comparison it would appear that both in Period II. and in Period III. the smaller ration was insufficient for maximum production. For it will be noted that in each period the group receiving the higher allowance of cake showed the lesser falling off in productiveness with advance of lactation and season.

Thus in Period II. the difference in favour of Group II. was a virtual increase of 2·2 per cent of milk, 4·8 per cent of butter-fat, and 1·3 per cent of solids-not-fat, coupled with a relative improvement in live-weight of 4·7 per cent (*vide* Table V. *a*).

Similarly during Period III., Group I., receiving the more liberal food-supply, showed an improvement as compared with Group II. of 2·2 per cent of milk, 3 per cent of butter-fat, 3·5 per cent of solids-not-fat, and 1 per cent live-weight (*vide* Table V. *b*).

Moreover, since in each period the falling off in the yield of butter-fat was less in proportion than the decrease in the yield of milk, an improvement to the extent of ·05–·1 per cent is indicated in the quality of the milk in so far as it is determined by the proportion of fat present in it. The differences are small, but so unanimously in favour of the better-fed cows that there would appear to be little doubt that they were caused mainly, if not entirely, by the differences in the food-supply.

This conclusion is further strengthened by the comparison of the records of the two groups for consecutive short periods throughout the experiment. This comparison may be readily effected by means of figs. 1, 2, pp. 125, 126. (For explanation of diagrams see p. 114.)

From a general survey of the diagrams it is plain that,—apart from divergences in a few three-day sections which are not surprising in view of the smallness of the groups,—there was a gradual relative improvement in the case of the cows whose ration was increased (Group II. in fig. 1, Group I. in fig. 2), the improvement being discernible during the intermediate period in which the allowance of cake was gradually increased, and becoming more pronounced, and on the whole fairly constant after the maximum allowance had been reached. This was particularly the case during Period II. (fig. 1), the regularity being less pronounced during Period III. (fig. 2).

It is also of interest, and desirable, to compare the records for the individual members of the two groups. For this purpose Tables VI. and VII., p. 120, have been drawn up. These tables record, in the case of each cow, the differences between the averages for Periods I. and II. (Table VI.), and Periods II. and III. respectively,—these differences, in the case of the total yields and live-weight, being expressed as *percentage* decreases of the mean for the earlier period, but in the case of the percentage of fat and of solids-not-fat represent the actual changes in the means.

In the case of each group the data are arranged in each column in order of magnitude, the greatest decrease (or smallest increase) coming at the head of the column. Each datum is accompanied by the number (in brackets) of the cow to which it refers.

TABLE VI.—Comparison of Averages for Periods I. and II. for each individual Cow.

Group I.

Percentage Decrease in				Actual Increase (+) or Decrease (−) in Percentage of	
Total Yield of					
Milk.	Butter-fat.	Solids-not-fat.	Live-weight (Increase +).	Fat.	Solids-not fat.
%	%	%	%	%	%
39·7 (2)	36·3 (2)	43·1 (2)	13·6 (2)	+0·15 (9)	−0·49 (2)
14·9 (14)	10·5 (9)	16·4 (14)	5·2 (9)	+0·18 (2)	−0·18 (23)
14·4 (9)	8·9 (14)	15·7 (9)	4·8 (14)	+0·20 (23)	−0·16 (14)
11·7 (16)	4·0 (23)	13·0 (16)	4·0 (16)	+0·23 (14)	−0·14 (9)
9·3 (23)	2·4 (16)	11·1 (23)	1·5 (23)	+0·38 (16)	−0·14 (16)

Group II.

26·6 (8)	15·1 (8)	31·6 (8)	2·5 (15)	+0·25 (1)	−0·39 (8)
17·5 (1)	10·9 (1)	19·5 (1)	2·1 (8)	+0·29 (6)	−0·39 (15)
14·7 (15)	6·0 (6)	18·3 (15)	0·6 (19)	+0·36 (15)	−0·27 (19)
12·3 (6)	4·8 (15)	14·8 (19)	0·2 (1)	+0·43 (19)	−0·23 (1)
12·2 (19)	3·2 (19)	13·0 (6)	+0·5 (6)	+0·47 (8)	−0·07 (6)

TABLE VII.—Comparison of Averages for Periods II. and III. for each individual Cow.

Group I.

22·1 (23)	15·0 (9)	20·0 (23)	+2·7 (16)	+0·24 (14)	+0·13 (14)
21·0 (9)	12·3 (16)	19·6 (9)	+5·6 (23)	+0·27 (9)	+0·16 (9)
20·6 (16)	11·4 (23)	18·2 (16)	+6·7 (9)	+0·41 (16)	+0·24 (23)
16·5 (14)	10·9 (14)	15·2 (14)	+7·3 (14)	+0·50 (23)	+0·28 (16)

Group II.

23·7 (15)	20·5 (15)	23·9 (15)	+0·4 (19)	+0·11 (19)	−0·10 (19)
23·0 (6)	18·4 (19)	23·0 (19)	+3·8 (1)	+0·14 (15)	−0·02 (15)
22·1 (19)	12·8 (6)	21·1 (6)	+6·4 (15)	+0·42 (1)	+0·12 (1)
19·2 (1)	9·1 (1)	18·1 (1)	+6·7 (6)	+0·58 (6)	+0·21 (6)

Comparing first the data in Table VI., the most apparent feature of interest is the exceptionally great shrinkage in production of milk and milk-solids in the case of two cows, viz., No. 2 (Group I.) and No. 8 (Group II.) Indeed, apart from these two cows, the records of the two groups are very similar in every respect save the decrease in live-weight, which was appreciably less in the case of Group II. than Group I. (cf. Tables III. and IV., pp. 115, 116),—one cow (No. 6) of the former group registering an actual increase. The disproportionate influence of these two cows on the averages for the groups is seen in the fact that if they are left out of account Group II. has in some respects actually a rather worse record than Group I., as may be seen in the following table:—

	Percentage Decrease in				Actual Increase (+) or Decrease (−) in Percentage of	
	Total Yield of					
	Milk.	Fat.	Solids-not-fat.	Live-weight	Fat.	Solids-not-fat.
	%	%	%	%	%	%
Group I. (without No. 2) .	12·8	6·2	14·1	3·9	+0·25	−0·16
Group II. (without No. 8) .	13·9	5·8	16·2	0·7	+0·39	−0·24

It will be noted that the four cows of Group II. showed a decrease in yield of milk and of solids-not-fat rather greater than the average for the four cows of Group I., whilst in the case of the yield of fat a slight difference in the opposite direction was recorded. The differences are, however, so slight that they may be ignored, and the records of the two groups regarded as practically identical in these respects. There is, however, still a substantial difference in favour of Group II. in the changes in live-weight.

It would appear, therefore, that so far as these cows (1, 6, 15, 19) were concerned, the greater part, if not the whole of the extra food supplied was expended in checking the falling off in live-weight, leaving little or no balance to affect the milk-secretion. It is to be noted, however, that owing to the different rates of shrinkage in the secretion of milk-serum and fat, an appreciable improvement in the *percentage* of fat was recorded.

On referring to Table I., p. 112, it will be seen that the two cows, of which special mention has been made above (No. 2 and 8), as showing the most pronounced falling off in productivity, were the least advanced of all in lactation. Further investigation of the influence of the period of lactation on the rate of shrinkage in the secretion of milk shows that this was indeed the dominant factor during this period of the experiment. This is clearly seen from the following table, in which the order of increasing lactation of the ten cows is contrasted with the decreasing magnitude of the shrinkage in production of milk and milk-solids, of the increase in the percentages of fat and of solids-not-fat, and in live-weight as recorded in Table VI.

Order of Increasing Lactation.	Order of Magnitude of Decrease.					
	Milk-yield.	Total Fat.	Total Solids-not-fat	Fat %	Solids-not-fat %	Live-weight.
Cow No.	Cow No.	Cow No.	Cow No.	Cow No.	Cow No.	Cow No.
2	(Greatest Decrease) 2	2	2	9	2	2
8	8	8	8	2	8	9
14	1	1	1	23	15	14
15	14	9	15	14	19	16
9	15	14	14	1	1	15
6	9	6	9	6	23	8
1	6	15	19	15	14	23
19	19	23	6	16	9	19
23	16	19	16	19	16	1
16	(Lowest) 23	16	23	8	6	6

It will be seen that, despite the differences in treatment of individual cows, there was a very marked connection between the period of lactation and the rate of falling off in the total secretion of milk and of solids-not-fat (*i.e.*, in the amount of milk-serum produced), which is also apparent to a lesser extent in the case of the total fat, but is not reflected in the percentage composition of the milk.

The data thus furnish a striking illustration of the general rule that the milk-flow is most susceptible to change in the earlier stages of lactation.

On referring again to Table I. it will be noted that with the exception of Nos. 2, 8, and 14, all the cows at the outset of the experiment had been milking for three months or more, so that the smallness of the effects produced on the milk-secretion by the increased supply of food was probably to some extent due to the advanced degree of lactation of the majority of the cows. This is borne out by the records for Period III., the cows by that time being in such an advanced stage of lactation that the disturbing effects were no longer appreciable, and the effects of the increased supply of food can be seen on comparing the individual members of each group (Table VII., p. 120). There can be no doubt in this case that the improvement in the case of Group I. (see Table V. *b*, p. 118) was due to the extra allowance of cake.

Another factor which may possibly have been partly responsible for the smallness of the effects produced by the extra food-supply is the age of the animals, all being from five to eight years old, and therefore, in some cases at least, presumably past their prime as milk producers. No such influence of age is, however, readily discernible in the experimental data.

Further details of the records of the individual cows are given in Tables IX.-XVIII., pp. 131-140.

The nett economic result of the experiment is difficult to estimate owing to the changes in live-weight which were brought about by the heavier feeding. It is of interest, however, to compare the value of the saving in milk and butter-fat with the cost of the extra food by which it was effected.

	Period II. (5 cows).	Period III. (4 cows).
Cost on farm of 2 lb. decort. cotton-cake per cow for 21 days (£7, 18s. 4d. per ton)	178 pence	142 pence
*Relative increase in yield of milk . .	65·5 lb.	50 lb.
Value at 8d. per gallon	51 pence	39 pence
*Relative increase in yield of butter-fat.	4·9 lb.	2·5 lb.
Value as butter containing 85 per cent of fat, at 1s. 2d. per lb.	81 pence	41 pence

* Deduced from the records of the more heavily fed group, after making allowance for the normal shrinkage as compared with the immediately preceding period, which is indicated by the records of the other group.

It will be seen that, in so far as milk and butter production is concerned, the higher feeding was far from being economical. Moreover, as may be seen by comparing the data for Periods I. and II. in Tables III. and IV., pp. 115, 116, the improvement in the quality of the morning milk was not sufficient to justify the expense incurred in effecting it, since it failed to ensure the desired 3 per cent of fat in the morning milk.

Conclusions as to Effects of Increase in Food-Supply under the Conditions of Experiment.

The considerations dealt with in the foregoing discussion of the experimental data appear to the writer to point to the following conclusions as to the influence of the quantity of dry food supplied to cows on pasture at the Manor Farm, Garforth, from the middle of July to the middle of October 1905.

(*a*) During August an allowance of 2 lb. undecorticated and 2 lb. decorticated cotton-cake per cow per day sufficed neither for the maximum production of milk and milk-solids nor for the maintenance of live-weight.

(*b*) By increasing the allowance of the decorticated cake to 4 lb. per cow per day the falling off in live-weight was in the earlier half of the period (*i.e.*, in August) almost completely checked, and the falling off in productiveness was also retarded, though only very slightly.

(*c*) In the later stages of the period the allowance of 2 lb. undecorticated and 4 lb. decorticated cotton-cake was more than sufficient for the maintenance of live-weight, and although a further allowance of 2 lb. of the decorticated cake effected a slight, though distinct, improvement in milk production, its effect was most decided on the live-weight of the cows.[1]

(*d*) It would appear that the secretion of milk was affected to the greatest extent by external influences—and therefore probably by the food-supply—in the earlier stages of lactation, say up to the end of the fourth month or so, after which apparently very little improvement was effected by the supply of quantities of food above the minimum essential for the maintenance of live-weight, the improvement being probably far from sufficient to repay the cost of the additional food.

(*e*) Apparently this minimum was almost reached by the supply of 2 lb. undecorticated and 4 lb. decorticated cotton-cake to each cow daily during July and August, whilst a lesser quantity would probably have sufficed during the later portion of the period under consideration.

(*f*) It would appear, therefore, that the amount of concentrated food required to supplement the pasturage was determined more by the shrinkage in milk production and advance of lactation than by the advance of season.

These conclusions apply of course strictly only to the experiment here described, which was so limited in scope that it can be regarded only as a preliminary inquiry on which no generalisations should be based. The results indicate, however, that the subject will repay further investigation on a more extensive scale.[2]

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[1] This was indeed apparent to the eye in the improved condition of the animals.

[2] Since the above was written, the report of more extensive investigations on similar lines, carried out by the authorities of Armstrong College, has been issued (Durham County Council, Offerton Bulletin No. 1, 1905). As in the Garforth experiment, two groups of five cows each were employed, and precisely similar conclusions were arrived at. These investigations extended over two years, and included both winter and summer feeding.

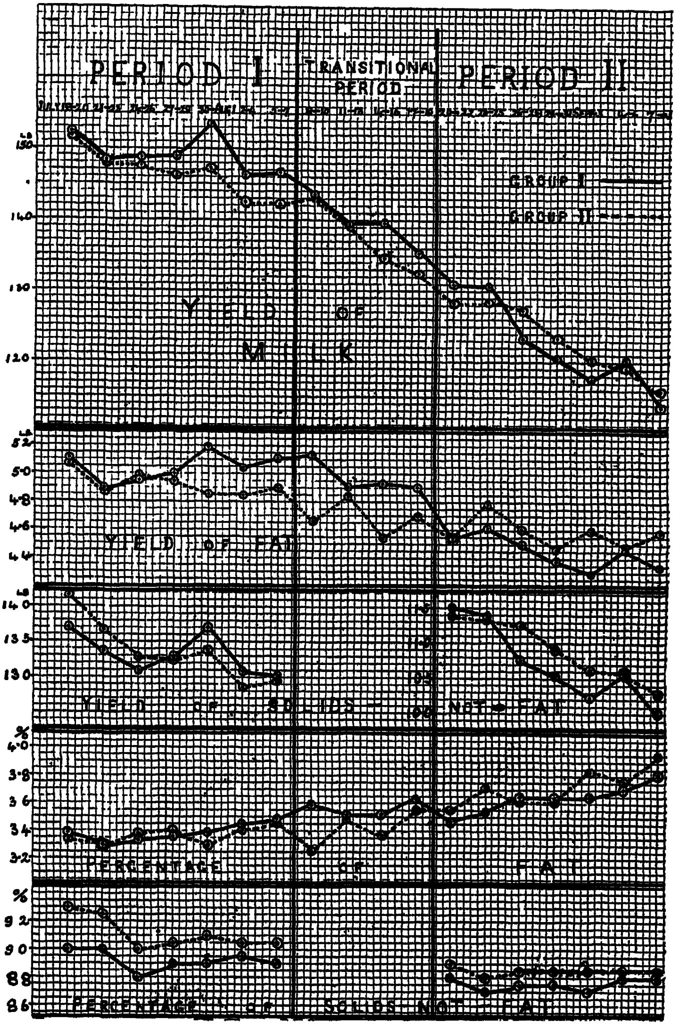

Fig. 1 —Diagram showing Fluctuations in Yield and Quality of Milk during Pfriods I. and II.

(Means ror Consecutive Periods of three Days each.)

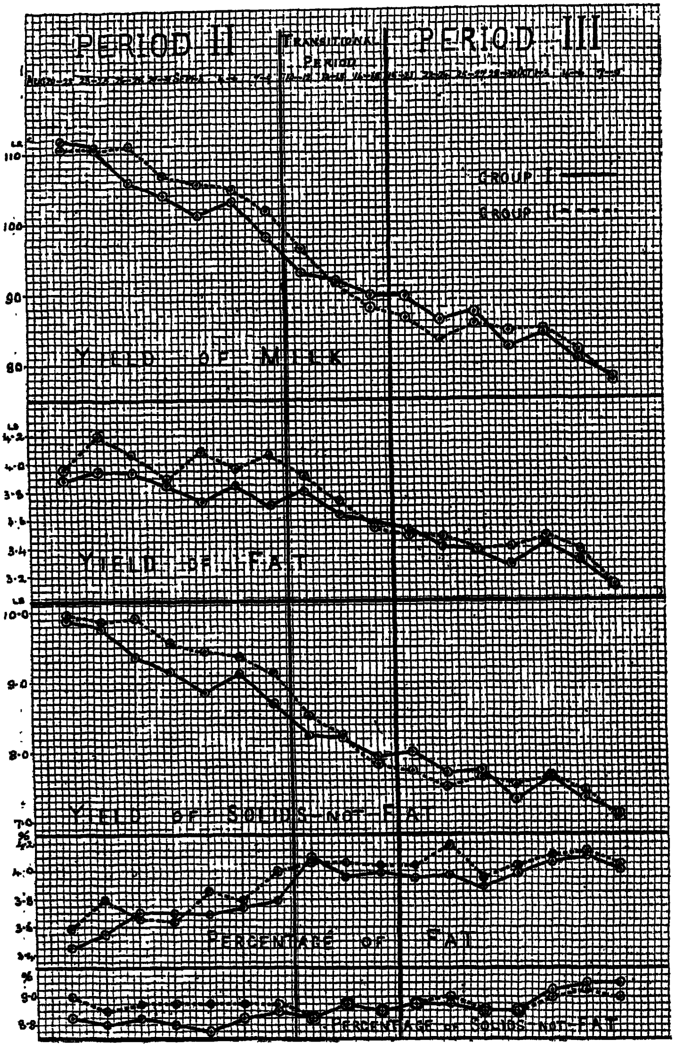

Fig. 2.—Diagram showing Fluctuations in Yield and Quality of Milk during Periods II. and III.

(Means for Consecutive Periods of three Days each.)

Comparison of Morning and Evening Milk.

In addition to the information bearing directly on the experiment already discussed, the data contained in Tables III. and IV., pp. 115, 116, show other features of interest, notably in connection with the results obtained at the two daily milkings.

Thus it is noticeable that whilst the yields of milk and of non-fatty solids are roughly proportional to the intervals of time preceding the milkings, the amount of butter-fat obtained at each milking is, during short periods, almost constant, being, however, in general during the greater part of the period in question slightly greater at the evening than at the morning milking. The extent of these regularities can be seen clearly in the following table, compiled from the weekly averages of all the cows, as arrived at by combining Tables III. and IV.:—

RATIO, A.M. : P.M.

Period.	Total Yield of Milk.	Total Yield of Solids-not-fat.	Total Yield of Fat.
July 18–July 24	1·39 : 1	1·42 : 1	0·98 : 1
" 25– " 31	1·36	1·38	0·91
Aug. 1–Aug. 7	1·39	1·39	0·92
" 20– " 26	1·39	1·40	0·90
" 27–Sept. 2	1·38	1·38	0·89
Sept. 3– " 9	1·38	1·39	0·89
" 10– " 18	1·43	1·43	1·00
" 19– " 25	1·38	1·38	0·96
" 26–Oct. 2	1·38	1·38	0·99
Oct. 3– " 9	1·38	1·40	1·01
Mean . .	1·39 : 1	1·39 : 1	0·95 : 1

Ratio of Intervals between Milkings—Night : Day = 1·56 : 1.

The slight excess of butter-fat obtained at the evening milking, as compared with the morning milking, may perhaps be ascribed to greater efficiency of milking in the former case owing to the easier nature of the milker's task. This receives support from the fact that the difference tended to disappear towards the end of the period, when the morning yields had diminished considerably. Precisely similar regularities may be observed in the data obtained during the previous summer (cf. 'Trans.' for 1905, Tables II., III., pp. 302, 303).

The data thus afford an excellent illustration of the well-known fact that the quantity of water and of solids other than fat (*i.e.*, of milk-serum) obtained at any milking is, in the main, a function of the interval of time which has elapsed since the immediately preceding milking, whereas the yield of butter-fat is apparently in no way determined by this interval, the same amount of fat being in this case obtained after nine hours as after fifteen hours.

The further discussion of this striking phenomenon lies beyond the scope of the present communication.

VARIATIONS IN THE QUALITY OF THE MIXED MILK OF THE GARFORTH HERD.

Following the practice of the previous five years, the mixed milk of the herd was sampled at each milking throughout the period over which the investigations extended, in order to ascertain the extent to which the fluctuations in quality in the milk of the individual cows were reflected in the case of the mixed milk of the 19-20 cows of the herd.

The samples were drawn from the churns by means of a glass tube, as described by Ingle ('Trans.,' 1903, p. 138). Comparative tests showed the method to be very reliable, provided the tube be not lowered too rapidly through the milk.

The data obtained are summarised in Table VIII., p. 130, which contains the average percentages of fat and of solids-not-fat, and the range of variation in the daily results for each successive week throughout the period in question.

The data for the morning and evening samples are given separately, and in addition data are supplied representing the total produce of each day, as calculated from the yield and percentage composition of the milk obtained at each milking.

It will be noted that the range of variation in quality and the averages for the whole period were as follows:—

	Limits of Variation.				Average Quality.	
	Fat %		Solids-not fat %		Fat %	Solids-not-fat %
	Min	Max.	Min	Max.		
Morning milk . .	2·6	4·1	8·75	9·6	3·13	9·03
Evening " . .	3·5	5·1	8·7	9·4	4·32	8·98
Total daily produce .	3·05	4·5	8·8	9·4	3·62	9·01

The facts may further be recorded that the morning milk contained less than 3 per cent of fat on thirty days, all—with one exception (September 3)—prior to August 28; the evening milk contained less than 4 per cent of fat on eighteen days—all prior to August 18; whilst the total daily produce never contained less then 3 per cent of fat, and indeed on only three occasions did it contain less than 3·2 per cent.

The lowest value recorded in the case of the percentage of solids-not-fat was 8·7 per cent on the afternoon of Sunday, August 20. It is noteworthy that the percentage of solids-not-fat tended to rise towards the close of the period—possibly partly owing to the introduction of a newly calved cow into the milking herd on September 28, the yield of the majority of the cows having fallen off very considerably by this time. This was not the only cause, however, for the rise was noticeable in the case of the cows under experiment (*vide* Tables III. IV., pp. 115, 116). In general the percentage of solids-not-fat was remarkably constant throughout the experiment, and there was at no time such a marked falling off as was observed in September 1904 (*vide* 'Trans.,' 1905, p. 326).[1]

The variations in the quality of the milk at the different milkings and at different periods of the summer were thus, in the main, very similar to those recorded in previous years, and need no further comment. (For discussion of some causes of variation, *vide* 'Trans.,' 1905, pp. 329, 330.)

In conclusion, attention may be directed to Table XIX., p. 141, in which the samples of the mixed milk of the herd obtained during the investigations of 1903, 1904, and 1905 are classified according to their richness in fat. It is especially interesting to note that whereas fully 50 per cent of the morning samples contained less than 3 per cent of fat—notably in June, July, and August—the evening milk never contained less than 3·5 per cent, and in only about 25 per cent of the samples did it contain less than 4 per cent.

It will further be noted that the produce of the whole day—*i.e.*, the mixed morning and evening milk—never contained less than 3 per cent of fat; and indeed on more than 40 per cent of the days in question contained upwards of 3½ per cent of fat.

The data also illustrate clearly the marked improvement in quality of the milk, in respect of fat, towards September—partly due to advance of lactation, and partly to advance of season.

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[1] The view that this falling off was due to exceptional dryness of the months of August and September 1904, receives support from the meteorological data recorded at Garforth, from which the following are abstracted :—

August and September.	1903.	1904.	1905.
Rainfall (inches) . .	4·66	3·91	5·75
Sunshine (hours) . .	263	327	260

It will be noted that for the two months in 1904 the rainfall was decidedly lower and the amount of bright sunshine decidedly higher than in 1903 or 1905.

TABLE VIII.—MIXED MILK OF THE HERD.

Week ending	Morning.						Evening.						Whole Day.					
	Fat.			Solids-not-fat.			Fat.			Solids not fat.			Fat.			Solids not-fat.		
	Mean.	Min.	Max.	Mean.	Min.	Max.	Mean.	Min.	Max.	Mean.	Min.	Max.	Mean.	Min.	Max.	Mean.	Min.	Max.
	%	%	%	%	%	%	%	%	%	%	%	%		%	%	%	%	%
July 24 . .	2·85	2·6	3·0	9 2	8·8	9·6	3·80	3·5	3·95	9·0	8·8	9·3	3·20	3·05	3·4	9·1	8·8	9·4
„ 31* . .	2·89	2·65	3·1	9·05	8·75	9·5	4·00	3·65	4·35	9·0	8·9	9·1	3·35	3·2	3·45	9·05	8·85	9·3
Aug. 7 . .	2·91	2·8	3·05	9·0	8·90	9·15	4·11	3·8	4·35	8·95	8·85	9·2	3·41	3·35	3·5	9·0	8·9	9·0
„ 14 . .	2·88	2·75	3·15	...	...	...	3·92	3·6	4·3	...	...	...	3·32	3·2	3·5	...	...	...
„ 21 . .	2·81	2·6	3 0	8·95	8·8	9·1	4·07	3 9	4·45	8·9	8·7	9·1	3·33	3·2	3·6	8·95	8·85	9·0
„ 28* . .	3·13	2·9	3·45	9·0	8·95	9·1	4·33	4 0	4·8	8·95	8·85	9·0	3·58	3·35	3·85	9·0	8·9	9·0
Sept. 4 . .	3·16	2·9	3·45	9·0	8·9	9·15	4·47	4·3	4·75	8·95	8·9	9 05	3·71	3·5	3·85	9·0	8·85	9·05
„ 11 . .	3·21	3·05	3·35	9·0	8·8	9·1	4·49	4·1	4·8	8·9	8·8	9·1	3·74	3·5	3·9	9·0	8·8	9·1
„ 18 . .	3·50	3·1	4·1	9·0	8·95	9·05	4·65	4·3	5·1	9·0	8·85	9·1	3·98	3·75	4·5	9 0	8·9	9·0
„ 25 . .	3·27	3·15	3·4	9·0	8·95	9·05	4·56	4 3	4·9	9·0	8·85	9·15	3·81	3·65	3·95	9·0	8.9	9·1
Oct. 2* . .	3·37	3 05	3·7	8 95	8·85	9·0	4·65	4·2	5·05	8·95	8·8	9·2	3·91	3·55	4·15	8·95	8·85	9·1
„ 9 . .	3·62	3·4	4·0	9 2	9·05	9·4	4·78	4·6	5·05	9·2	9·0	9·4	4·12	3·9	4·35	9·2	9·15	9·3
Whole Period (12 weeks)	3·13	2·6	4·1	9·03	8·75	9 6	4·32	3·5	5·1	8 98	8·7	9·4	3·62	3 05	4·5	9 01	8·8	9·4

* In each of these weeks an additional fresh-milking cow was introduced.

TABLE IX.—COW No. 1. (GROUP II.) AGE, 5 years.

PERIOD OF LACTATION (to July 18), 27 weeks. WEIGHT on July 28, 11 cwt. 0 qr. 10 lb.

MEAN DAILY RESULTS.

PERIOD.		Milk yield.		Fat.		Solids-not-fat.		Total yield of fat.		Total yield of solids-not-fat.		Mixed morning and evening milk.			REMARKS.
		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	Yield.	Fat.	S-N-F.	
		lb.	lb.	%	%	%	%	lb.	lb.	lb.	lb.	lb.	%	%	
I.	July 18–July 24	14·9	10·8	2·65	3·82	9·7	9·3	0·40	0·42	1·45	1·00	25·7	3·2	9·5	Received daily— 2 lb. undecorticated cotton-cake. 2 " decorticated " "
	" 25– " 31	14·8	10·8	2·63	3·74	9·3	9·2	0·39	0·40	1·38	0·99	25·6	3·1	9·3	
	Aug. 1–Aug. 7	14·9	10·6	2·67	3·72	9·4	9·3	0·40	0·39	1·39	1·00	25·5	3·1	9·4	
Daily average for whole of Period I. (3 weeks)		**14·86**	**10·74**	**2·65**	**3·76**	**9·5**	**9·3**	**0·395**	**0·408**	**1·408**	**0·997**	**25·60**	**3·15**	**9·4**	RATIO, A.M. : P.M. Yield, 1·38 : 1. Fat, %, 1 : 1·41.
II.	Aug. 20–Aug. 26	12·9	9·0	2·83	3·91	9·1	9·1	0·37	0·35	1·17	0·82	21·9	3·3	9·1	Food as in Period I., with addition of 2 lb. decorticated cotton-cake daily. Live-weight dec. (July 28–Sept. 9), 2 lb.
	" 27–Sept. 2	12·4	9·0	2·84	4·03	9·2	9·2	0·35	0·36	1·14	0·83	21·4	3·4	9·2	
	Sept. 3– " 9	12·1	7·9	3·11	4·12	9·2	9·2	0·38	0·33	1·11	0·73	20·0	3·5	9·2	
Daily average for whole of Period II. (3 weeks)		**12·48**	**8·64**	**2·93**	**4·02**	**9·2**	**9·2**	**0·367**	**0·349**	**1·143**	**0·793**	**21·12**	**3·4**	**9·2**	RATIO, A.M. : P.M. Yield, 1·44 : 1. Fat, %, 1 : 1·37.
III.	Sept. 19–Sept. 25	10·6	7·2	3·29	4·19	9·3	9·3	0·35	0·30	0·98	0·67	17·8	3·7	9·3	Food as in Period II. Live-weight increase (Sept. 9–Oct. 9), 48 lb.
	" 26–Oct. 2	10·8	6·4	3·56	4·26	9·2	9·2	0·38	0·28	1·00	0·60	17·2	3·8	9·2	
	Oct. 3– " 9	9·5	6·7	3·55	4·44	9·3	9·4	0·34	0·30	0·89	0·63	16·2	3·9	9·3	
Daily average for whole of Period III. (3 weeks)		**10·29**	**6·79**	**3·47**	**4·30**	**9·3**	**9·3**	**0·357**	**0·293**	**0·954**	**0·631**	**17·08**	**3·8**	**9·3**	RATIO, A.M. : P.M. Yield, 1·51 : 1. Fat, %, 1 : 1·24.
Highest value recorded		15·5	11	4·28	5·20	10·5	9·9	0·47	0·44	1·58	1·06	26·5	4·5	9·9	RATIO, A.M. : P.M. Yield, 1·92 : 1. Fat, %, 1 : 1·64.
Lowest value recorded		9·0	5½	2·45	3·40	8·9	8·9	0·27	0·20	0·83	0·51	15·0	3·0	9·0	RATIO, A.M. : P.M. Yield, 1·19 : 1. Fat, %, 1 : 0·91.

Average interval between Milkings—Night : Day=1·61 : 1.

TABLE X.—COW No. 2. (Group I.) Age, 5 years.

Period of Lactation (to July 18), 12 weeks. Weight on July 28, 10 cwt. 3 qr.

MEAN DAILY RESULTS.

Period.	Milk yield.		Fat.		Solids-not-fat.		Total yield of fat.		Total yield of solids-not-fat.		Mixed morning and evening milk.			Remarks.
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	Yield.	Fat.	S.-N.-F.	
	lb.	lb.	%	%	%	%	lb.	lb.	lb.	lb.	lb.	%	%	
I. July 18–July 24	18·5	11·9	2·82	3·71	8·8	8·7	0·52	0·44	1·63	1·04	30·4	3·2	8·8	Received daily— 2 lb. undecorticated cotton-cake. 2 " decorticated " "
" 25– " 31	17·5	12·1	2·82	3·86	8·9	8·7	0·49	0·47	1·56	1·05	29·6	3·3	8·8	
Aug. 1– Aug. 7	16·4	10·6	3·18	3·87	8·9	8·8	0·52	0·41	1·45	0·94	27·0	3·5	8·9	
Daily average for whole of Period I. (3 weeks)	**17.45**	**11·52**	**2·94**	**3·81**	**8·9**	**8·7**	**0·511**	**0·439**	**1·547**	**1·007**	**28·98**	**3·35**	**8·8**	Ratio, A.M. : P.M. Yield, 1·51 : 1. Fat, %, 1 : 1·30.
II. Aug. 20–Aug. 26	11·9	7·6	3·18	3·84	8·3	8·3	0·38	0·29	0·99	0·63	19·5	3·4	8·3	Food as in Period I. Live-weight decrease (July 28–Sept. 9), 164 lb.
" 27–Sept. 2	9·9	6·6	2·99	3·56	8·2	8·3	0·30	0·24	0·82	0·55	16·5	3·2	8·2	
Sept. 3– " 9	9·7	6·7	3·45	4·13	8·5	8·3	0·33	0·28	0·82	0·56	16·4	3·7	8·4	
Daily average for whole of Period II. (3 weeks)	**10·50**	**6·98**	**3·21**	**3·84**	**8·3**	**8·3**	**0·336**	**0·270**	**0·876**	**0·579**	**17·48**	**3·45**	**8·3**	Ratio, A.M. : P.M. Yield, 1·50 : 1. Fat, %, 1 : 1·20.
Highest value recorded	20	13½	3·90	4·62	9·2	9·2	0·575	0·520	1·730	1·195	32·5	4·1	9·0	Ratio, A.M. : P.M. Yield, 1·75 : 1. Fat, %, 1 : 1·51.
Lowest value recorded	7½	6½	2·68	3·25	8·0	8·0	0·275	0·210	0·615	0·525	14·0	3·0	8·1	Ratio, A.M. : P.M. Yield, 1·15 : 1. Fat, %, 1 : 1·04.

Average interval between Milkings—Night : Day=1·59 : 1.

TABLE XI.—COW No. [illegible]. (GROUP II.) AGE, [illegible] years.

PERIOD OF LACTATION (to July 18), 20 weeks. WEIGHT on July 28, 11 cwt. 0 qr. 14 lb.

MEAN DAILY RESULTS.

PERIOD.	Milk yield.		Fat.		Solids-not-fat.		Total yield of fat.		Total yield of solids-not-fat.		Mixed morning and evening milk.			REMARKS.
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	Yield.	Fat.	S-N-F	
	lb.	lb.	%	%	%	%	lb.	lb.	lb.	lb.	lb.	%	%	
I. July 18–July 24	18·4	13·2	3·85	4·70	9·4	9·1	0·71	0·62	1·72	1·19	31·6	4·2	9·3	Received daily— 2 lb. undecorticated cotton-cake. 2 " decorticated " "
" 25– " 31	17·1	12·9	3·53	4·76	9·2	9·2	0·60	0·62	1·57	1·19	30·0	4·1	9·2	
Aug. 1–Aug. 7	17·2	13·1	3·38	5·02	9·2	9·1	0·58	0·64	1·59	1·19	30·3	4·0	9·2	
Daily average for whole of Period I. (3 weeks)	17·57	13·05	3·59	4·83	9·3	9·1	0·633	0·625	1·626	1·188	30·62	4·1	9·2	RATIO, A.M. : P.M. { Yield, 1·35 : 1. Fat, %, 1 : 1·35.
II. Aug. 20–Aug. 26	15·8	11·6	3·27	5·31	9·1	9·0	0·52	0·62	1·44	1·05	27·4	4·2	9·1	Food as in Period I., with addition of 2 lb. decorticated cotton-cake daily. Live-weight inc. (July 28–Sept. 9), 6 lb.
" 27–Sept. 2	15·7	11·5	3·56	5·60	9·2	9·1	0·56	0·65	1·44	1·01	27·2	4·4	9·2	
Sept. 3– " 9	15·3	10·6	3·83	5·80	9·3	9·1	0·59	0·62	1·41	0·97	25·9	4·7	9·2	
Daily Average for whole of Period II. (3 weeks)	15·60	11·26	3·56	5·57	9·2	9·1	0·555	0·627	1·431	1·018	26·86	4·45	9·2	RATIO, A.M. : P.M. { Yield, 1·38 : 1. Fat, %, 1 : 1·56.
III. Sept. 19–Sept. 25	11·5	9·5	4·26	5·69	9·3	9·4	0·49	0·54	1·07	0·89	21·0	4·9	9·3	Food as in Period II. Live-weight increase (Sept. 9–Oct. 9), 84 lb.
" 26–Oct. 2	12·0	9·4	4·26	5·84	9·3	9·3	0·51	0·55	1·11	0·87	21·4	4·9	9·3	
Oct. 3– " 9	11·1	8·6	4·38	6·04	9·4	9·5	0·48	0·52	1·04	0·82	19·7	5·1	9·4	
Daily average for whole of Period III. (3 weeks)	11·52	9·17	4·30	5·86	9·3	9·4	0·495	0·536	1·072	0·859	20·69	5·0	9·3	RATIO, A.M. : P.M. { Yield, 1·26 : 1. Fat, %, 1 : 1·36.
Highest value recorded	19	14·5	5·05	6·62	10·2	9·6	0·81	0·74	1·78	1·35	33·5	5·7	9·7	RATIO, A.M. : P.M. { Yield, 1·58 : 1. Fat, %, 1 : 1·85.
Lowest value recorded	11	7·5	2·67	4·10	8·9	8·8	0·44	0·44	1·00	0·70	18·5	3·6	9·0	RATIO, A.M. : P.M. { Yield, 1·10 : 1. Fat, %, 1 : 1·07.

Average interval between Milkings—Night : Day = 1·51 : 1.

TABLE XII.—COW No. 8. (GROUP II.) AGE, 8 years.

PERIOD OF LACTATION (to July 18), 12 weeks. WEIGHT on July 28, 12 cwt. 0 qr. 8 lb.

MEAN DAILY RESULTS.

PERIOD.	Milk yield.		Fat.		Solids-not-fat.		Total yield of fat.		Total yield of solids not-fat.		Mixed morning and evening milk.			REMARKS.
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	Yield.	Fat.	S-N-F	
	lb.	lb.	%	%	%	%	lb.	lb.	lb.	lb.	lb.	%	%	
I. July 18–July 24	12·5	9·6	2·54	3·40	8·8	8·7	0·32	0·33	1·09	0·84	22·1	2·9	8·8	Received daily— 2 lb. undecorticated cotton-cake. 2 " decorticated " "
" 25– " 31	12·4	9·5	2·33	3·71	8·7	8·5	0·29	0·35	1·08	0·81	21·9	2·9	8·6	
Aug. 1–Aug. 7	12·1	9·0	2·33	4·04	8·8	8·8	0·28	0·36	1·06	0·79	21·1	3·0	8·8	
Daily average for whole of Period I. (3 weeks)	**12·36**	**9·36**	**2·40**	**3·72**	**8·8**	**8·7**	**0·293**	**0·348**	**1·082**	**0·811**	**21·72**	**2·95**	**8·7**	RATIO, A.M. : P.M. Yield, 1·32 : 1. Fat, %, 1 : 1·55.
II. Aug. 20–Aug. 26	10·3	7·3	2·71	4·09	8·2	8·2	0·29	0·30	0·84	0·60	17·6	3·3	8·2	Food as in Period I. with addition of 2 lb. decorticated cotton-cake daily. Live-weight dec. (July 28–Sept. 9), 28 lb.
" 27–Sept. 2	9·3	6·9	2·95	4·04	8·2	8·1	0·27	0·28	0·75	0·56	16·1	3.4	8·2	
Sept. 3– " 9	7·7	6·4	2·80	4·47	8·1	7·9	0·22	0·29	0·62	0·50	14·1	3·6	8·0	
Daily average for whole of Period II. (3 weeks)	**9·10**	**6·83**	**2·82**	**4·20**	**8·2**	**8·1**	**0·260**	**0·288**	**0·740**	**0·552**	**15·93**	**3·45**	**8·1**	RATIO, A.M. : P.M. Yield, 1·33 : 1. Fat, %, 1 : 1·49.
Highest value recorded	13·5	11·5	3·27	5·30	9·2	9·1	0·37	0·41	1·27	1·02	23·0	4·0	9·1	RATIO, A.M. : P.M. Yield, 1·78 : 1. Fat, %, 1 : 2.
Lowest value recorded	7·0	4·5	1·98	3·20	7·8	7·7	0·19	0·19	0·58	0·35	12·5	2·6	7·8	RATIO, A.M. : P.M. Yield, 0·96 : 1. Fat, %, 1 : 1·25.

Average interval between Milkings—Night : Day = 1·53 : 1.

TABLE XIII.—COW No. 9. (GROUP I.) AGE, 8 years.

PERIOD OF LACTATION (to July 18), 19 weeks. WEIGHT on July 28, 12 cwt. 3 qr. 6 lb.

MEAN DAILY RESULTS.

PERIOD.	Milk yield.		Fat.		Solids-not-fat.		Total yield of fat.		Total yield of solids-not-fat.		Mixed morning and evening milk.			REMARKS.
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	Yield.	Fat.	S-N-F	
	lb.	lb.	%	%	%	%	lb.	lb.	lb.	lb.	lb.	%	%	
I. July 18–July 24	17·6	12·9	3·12	4·05	9·0	8·6	0·55	0·53	1·58	1·11	30·5	3·5	8·8	Received daily—
„ 25– „ 31	17·9	12·6	2·87	3·93	8·7	8·6	0·51	0·51	1·56	1·08	30·5	3·3	8·7	2 lb. undecorticated cotton-cake.
Aug. 1–Aug. 7	18·4	13·9	2·63	3·99	8·7	8·7	0·48	0·55	1·60	1·21	32·3	3·2	8·7	2 „ decorticated „ „
Daily average for whole of Period I. (3 weeks)	17·95	13·14	2·87	3·99	8·8	8·6	0·517	0·528	1·583	1 134	31·09	3·3	8·7	RATIO, A.M. : P.M. Yield, 1·37 : 1. Fat, %, 1 : 1·39.
II. Aug. 20–Aug. 26	16·6	12·1	2·66	4·41	8·6	8·6	0·44	0·53	1·43	1·04	28·7	3·4	8·6	Food as in Period I.
„ 27–Sept. 2	14·3	10·7	3·02	4·46	8·6	8·6	0·43	0·48	1·22	0·92	25·0	3·6	8·6	Live-weight decrease (July 28–Sept. 9),
Sept. 3– „ 9	15·4	10·8	2·86	4·47	8·6	8·7	0·44	0·48	1·32	0·94	26·2	3·5	8·6	74 lb.
Daily average for whole of Period II. (3 weeks)	15·43	11·19	2·85	4·45	8·6	8·6	0·438	0·497	1·323	0·966	26·62	3·5	8·6	RATIO, A.M. : P.M. Yield, 1·38 : 1. Fat, %, 1 : 1·56.
III. Sept. 19–Sept. 25	12·1	9·9	3·05	4·50	8·7	8·8	0·37	0·45	1·05	0·87	22·0	3·7	8·7	Food as in Period II. with addition of
„ 26–Oct. 2	11·3	9·9	3·11	4·63	8·7	8·8	0·35	0·46	0·98	0·87	21·2	3·8	8·7	4 lb. decorticated cotton-cake daily.
Oct. 3– „ 9	10·9	8·9	3·22	4·62	8·8	8·9	0·35	0·41	0·96	0·79	19·8	3·9	8·8	Live-weight inc. (Sept. 9–Oct. 9), 92 lb.
Daily average for whole of Period III. (3 weeks)	11·45	9·57	3·13	4·58	8·7	8·8	0·357	0·438	1·004	0·842	21·02	3·8	8·7	RATIO, A.M. : P.M. Yield, 1·20 : 1. Fat, %, 1 : 1·46.
Highest value recorded	20	15	3·60	5 50	9·3	9·0	0·55	0·65	2·21	1·31	34·0	4·2	9·1	RATIO, A.M. : P.M. Yield, 1·68 : 1. Fat, %, 1 : 2·08.
Lowest value recorded	10	8	2·35	3·37	8·4	8·5	0·27	0·32	0·88	0·72	18·5	3·0	8·4	RATIO, A.M. : P.M. Yield, 1·09 : 1. Fat, %, 1 : 1·10.

Average interval between Milkings—Night : Day = 1·54 : 1.

TABLE XIV.—COW No. 14. (Group I.) Age, 8 years.

Period of Lactation (to July 18), 13 weeks. Weight on July 28, 12 cwt. 1 qr. 10 lb.

MEAN DAILY RESULTS.

Period.	Milk yield		Fat.		Solids-not-fat.		Total yield of fat.		Total yield of solids-not-fat.		Mixed morning and evening milk.			Remarks.
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	Yield.	Fat.	S.-N.-F.	
	lb.	lb.	%	%	%	%	lb.	lb.	lb.	lb.	lb.	%	%	
I. July 18–July 24	19·9	14·2	2·76	3·93	9·1	9·0	0·55	0·56	1·81	1·27	34·1	3·3	9·1	Received daily— 2 lb. undecorticated cotton-cake. 2 „ decorticated „ „
„ 25– „ 31	19·6	14·1	2·67	4·08	8·9	8·9	0·52	0·58	1·75	1·25	33·7	3·3	8·9	
Aug. 1–Aug. 7	19·6	13·1	2·88	4·15	9·0	9·0	0·56	0·55	1·76	1·18	32·7	3·4	9·0	
Daily average for whole of Period I. (3 weeks)	**19·67**	**13·81**	**2·77**	**4·05**	**9·0**	**9·0**	**0·554**	**0·557**	**1·774**	**1·212**	**33·48**	**3·3**	**9·0**	Ratio, A.M. : P.M. Yield, 1·42 : 1. Fat, %, 1 : 1·46.
II. Aug. 20–Aug. 26	18·2	12·0	2·88	4·33	8·8	8·7	0·53	0·52	1·61	1·05	30·2	3·5	8·8	Food as in Period I. Live-weight decrease (July 28–Sept. 9) 66 lb.
„ 27–Sept. 2	17·4	11·3	2·91	4·46	8·8	8·7	0·51	0·51	1·53	0·98	28·7	3·6	8·8	
Sept. 3– „ 9	15·8	10·9	2·98	4·54	8·8	8·6	0·48	0·49	1·39	0·93	26·7	3·7	8·7	
Daily average for whole of Period II. (3 weeks)	**17·12**	**11·38**	**2·92**	**4·44**	**8·8**	**8·7**	**0·506**	**0·507**	**1·51**	**0·988**	**28·50**	**3·6**	**8·8**	Ratio, A.M. : P.M. Yield, 1·50 : 1. Fat, %, 1 : 1·52.
III. Sept. 19–Sept. 25	14·8	10·1	3·17	4·52	8·9	8·7	0·47	0·45	1·31	0·88	24·9	3·8	8·8	Food as in Period II., with addition of 4 lb. decorticated cotton-cake daily. Live-weight inc. (Sept. 9–Oct. 9) 96 lb.
„ 26–Oct. 2	13·7	9·8	3·35	4·61	8·9	8·8	0·46	0·45	1·22	0·86	23·5	3·9	8·9	
Oct. 3– „ 9	14·0	9·1	3·37	4·39	9·0	9·0	0·47	0·40	1·27	0·82	23·1	3·7	9·0	
Daily average for whole of Period III. (3 weeks)	**14·17**	**9·64**	**3·30**	**4·51**	**8·9**	**8·8**	**0·468**	**0·434**	**1·267**	**0·851**	**23·81**	**3·8**	**8·9**	Ratio, A.M. : P.M. Yield, 1·47 : 1. Fat, %, 1 : 1·37.
Highest value recorded	21½	15	3·82	6·30	9·5	9·3	0·63	0·73	1·96	1·33	35·5	4·8	9·2	Ratio, A.M. : P.M. Yield, 1·82 : 1. Fat, %, 1 : 1·84.
Lowest value recorded	12½	8	2·32	3·60	8·6	8·4	0·37	0·35	1·11	0·73	22·0	2·9	8·6	Ratio, A.M. : P.M. Yield, 1·25 1. Fat, %, 1 : 1·15.

Average interval between Milkings—Night : Day = 1·59 : 1.

TABLE XV.—COW No. 15. (GROUP II.) AGE, 6 years.

PERIOD OF LACTATION (to July 18), 17 weeks. WEIGHT on July 28, 11 cwt. 1 qr. 16 lb.

MEAN DAILY RESULTS.

PERIOD.	Milk yield.		Fat.		Solids-not-fat.		Total yield of fat.		Total yield of solids-not-fat.		Mixed morning and evening milk.			REMARKS.
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	Yield.	Fat.	S-N-F	
	lb.	lb.	%	%	%	%	lb.	lb.	lb.	lb.	lb.	%	%	
I. July 18–July 24	19·9	14·5	2·20	3·80	9·3	8·9	0·45	0·55	1·86	1·29	34·4	2·9	9·1	Received daily— 2 lb. undecorticated cotton-cake. 2 " decorticated " "
" 25– " 31	19·1	14·1	2·32	3·97	9·1	8·9	0·44	0·56	1·73	1·25	33·2	3·0	9·0	
Aug. 1–Aug. 7	18·5	13·6	2·36	4·31	8·9	9·0	0·43	0·59	1·61	1·23	32·1	3·2	8·9	
Daily average for whole of Period I. (3 weeks)	19·05	14·05	2·29	4·03	9·1	8·9	0·444	0·567	1·735	1·259	33·10	3·05	9·0	RATIO, A.M. : P.M. { Yield, 1·36 : 1. Fat, %, 1 : 1·76.
II. Aug. 20–Aug. 26	16·8	12·4	2·61	4·42	8·8	8·7	0·44	0·55	1·48	1·07	29·2	3·4	8·8	Food as in Period I. with addition of 2 lb. decorticated cotton-cake daily. Live-weight dec. (July 28–Sept. 9), 32 lb.
" 27–Sept. 2	16·4	11·9	2·60	4·27	8·7	8·6	0·43	0·51	1·42	1·03	28·3	3·3	8·7	
Sept. 3– " 9	16·0	11·2	2·50	4·85	8·6	8·5	0·40	0·55	1·38	0·96	27·2	3·5	8·6	
Daily average for whole of Period II. (3 weeks)	16·40	11·83	2·57	4·51	8·7	8·6	0·424	0·538	1·426	1·020	28·23	3·4	8·7	RATIO, A.M. : P.M. { Yield, 1·39 : 1. Fat, %, 1 : 1·76.
III. Sept. 19–Sept. 25	13·7	8·7	2·92	4·65	8·6	8·7	0·40	0·41	1·18	0·76	22·4	3·6	8·6	Food as in Period II. Live-weight increase (Sept. 9–Oct. 9) 80 lb.
" 26–Oct. 2	12·8	8·7	2·98	4·37	8·6	8·5	0·38	0·39	1·10	0·74	21·5	3·6	8·6	
Oct. 3– " 9	12·4	8·3	2·73	4·51	8·7	8·7	0·34	0·37	1·08	0·72	20·7	3·5	8·7	
Daily average for whole of Period III. (3 weeks)	12·98	8·57	2·88	4·51	8·6	8·6	0.375	0·389	1·12	0·740	21·55	3·55	8·6	RATIO, A.M. : P.M. { Yield, 1·51 : 1. Fat, %, 1 : 1·57.
Highest value recorded	21	15·5	3·43	5·90	9·9	9·7	0·57	0·75	2·09	1·42	35·5	4·0	9·4	RATIO, A.M. : P.M. { Yield, 2·0 : 1. Fat, %, 1 : 2·55.
Lowest value recorded	11	7	1·77	3·20	8·4	8·3	0·26	0·23	0·95	0·61	19	2·6	8·3	RATIO, A.M. : P.M. { Yield, 1·19 : 1. Fat, %, 1 : 1·13.

Average interval between Milkings—Night : Day = 1·60 : 1.

TABLE XVI.—COW No. 16. (GROUP I.) AGE, 5 years.

PERIOD OF LACTATION (to July 18), 93 weeks. WEIGHT on July 28, 11 cwt. 3 qr. 20 lb.

MEAN DAILY RESULTS.

PERIOD.		Milk yield.		Fat.		Solids-not-fat.		Total yield of fat.		Total yield of solids-not fat.		Mixed morning and evening milk.			REMARKS.
		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	Yield.	Fat.	S.-N.-F	
		lb.	lb.	%	%	%	%	lb.	lb.	lb.	lb.	lb.	%	%	
I.	July 18–July 24	14·0	10·2	2·93	4·06	9·5	9·3	0·41	0·42	1·32	0·95	21·2	3·4	9·4	Received daily— 2 lb. undecorticated cotton-cake. 2 " decorticated " "
	" 25– " 31	14·3	10·2	2·88	4·34	9·4	9·4	0·41	0·45	1·31	0·96	21·5	3·5	9·4	
	Aug. 1–Aug. 7	13·4	9·9	2·99	4·86	9·4	9·4	0·40	0·48	1·25	0·93	23·3	3·8	9·4	
Daily average for whole of Period I. (3 weeks		13·88	10·08	2·93	4·42	9·4	9·4	0·408	0·448	1·305	0·948	23·96	3·6	9·4	RATIO, A.M. : P.M. Yield, 1·38 : 1. Fat, %, 1 : 1·51.
II.	Aug. 20–Aug. 26	12·6	9·5	3·07	4·66	9·2	9·3	0·39	0·44	1·16	0·88	22·1	3·8	9·2	Food as in Period I. Live-weight decrease (July 28–Sept. 9), 54 lb.
	" 27–Sept. 2	11·9	9·3	3·18	5·10	9·2	9·2	0·38	0·47	1·10	0·85	21·2	4·0	9·2	
	Sept. 3– " 9	11·2	9·0	3·24	5·02	9·3	9·3	0·37	0·45	1·05	0·84	20·2	4·1	9·3	
Daily average for whole of Period II. (3 weeks)		11·90	9·26	3·16	4·92	9·2	9·3	0·378	0·458	1·102	0·858	21·16	4·0	9·2	RATIO, A.M. : P.M. Yield, 1·28 : 1. Fat, %, 1 : 1·56.
III.	Sept. 19–Sept. 25	10·1	7·6	3·77	5·20	9·5	9·5	0·38	0·39	0·96	0·72	17·7	4·4	9·5	Food as in Period II. with addition of 4 lb. decorticated cotton-cake daily. Live-weight inc. (Sept. 9–Oct. 9), 34 lb.
	" 26–Oct. 2	9·9	7·1	3·89	4·86	9·4	9·6	0·38	0·34	0·94	0·67	17·0	4·3	9·5	
	Oct. 3– " 9	9·2	6·5	4·03	4·92	9·6	9·7	0·37	0·32	0·88	0·63	15·7	4·4	9·6	
Daily average for whole of Period III. (3 weeks)		9·76	7·05	3·90	4·99	9·5	9·6	0·380	0·353	0·928	0·676	16·81	4·4	9·5	RATIO, A.M. : P.M. Yield, 1·39 : 1. Fat, %, 1 : 1·28.
Highest value recorded		15	12	4·67	5·92	9·8	9·9	0·49	0·59	1·42	1·13	25·5	4·7	9·7	RATIO, A.M. : P.M. Yield, 1·60 : 1. Fat, %, 1 : 2·26.
Lowest value recorded		9	6	2·55	3·57	9·1	9·0	0·30	0·28	0·85	0·58	15·0	3·0	9·1	RATIO, A.M. : P.M. Yield, 1·06 : 1. Fat, %, 1 : 1.

Average interval between Milkings—Night : Day = 1·52 : 1.

TABLE XVII.—COW No. 19. (Group II.) Age, 8 years.

Period of Lactation (to July 18), 62 weeks. Weight on July 28, 10 cwt. 0 qr. 12 lb.

MEAN DAILY RESULTS.

Period.	Milk yield.		Fat.		Solids-not-fat.		Total yield of fat.		Total yield of solids-not fat.		Mixed morning and evening milk.			Remarks.
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	Yield.	Fat.	S-N-F	
	lb.	lb.	%	%	%	%	lb.	lb.	lb.	lb.	lb.	%	%	
I. July 18–July 24	20·8	15·8	2·67	4·11	9·6	9·3	0·56	0·65	1·99	1·47	36·6	3·3	9·5	Received daily— 2 lb. undecorticated cotton-cake. 2 " decorticated " "
I. " 25– " 31	19·9	15·6	2·69	4·49	9·2	9·1	0·54	0·70	1·83	1·41	35·5	3·5	9·2	
I. Aug. 1–Aug. 7	20·0	14·3	2·64	4·66	9·1	9·1	0·53	0·66	1·81	1·29	34·3	3·5	9·1	
Daily average for whole of Period I. (3 weeks)	20·22	15·21	2·67	4·42	9·3	9·2	0·543	0 673	1·876	1·390	35·43	3·45	9·3	Ratio, A.M. : P.M. { Yield, 1·32 : 1. Fat, %, 1 : 1·65.
II. Aug. 20–Aug. 26	18·4	14·0	3·02	4·93	9·0	8·9	0·56	0·69	1·65	1·25	32·4	3·9	9·0	Food as in Period I., with addition of 2 lb. decorticated cotton-cake daily. Live-weight dec. (July 28–Sept. 9) 6 lb.
II. " 27–Sept. 2	17·4	13·4	2·68	4·75	9·0	8·9	0·47	0·64	1·56	1·20	30·8	3·6	9·0	
II. Sept. 3– " 9	17·2	12·9	3·10	4·98	8·9	8·9	0·53	0·64	1·54	1·15	30·1	3·9	8·9	
Daily average for whole of Period II. (3 weeks)	17·67	13·43	2·93	4·89	9·0	8·9	0·520	0·632	1·583	1·171	31·10	3·8	9·0	Ratio, A.M. : P.M. { Yield, 1·32 : 1. Fat, %, 1 : 1·67.
III. Sept. 19–Sept. 25	14·1	10·0	3·56	4·92	8·8	8·8	0·50	0·49	1·24	0·88	24·1	4·1	8·8	Food as in Period II. Live-weight increase (Sept. 9–Oct. 9), 4 lb.
III. " 26–Oct. 2	14·4	10·4	3·21	4·72	8·7	8·9	0·46	0·49	1·25	0·92	24·8	3·8	8·8	
III. Oct. 3– " 9	14·4	9·5	3·27	4·94	8·9	9·0	0·47	0·47	1 28	0·86	23·9	3·9	8 9	
Daily average for whole of Period III. (3 weeks)	14·26	9·95	3·35	4·86	8·8	8·9	0·478	0·482	1·257	0·886	24·21	3·95	8·8	Ratio, A.M. : P.M. { Yield, 1·43 : 1. Fat, %, 1 : 1·45.
Highest value recorded	22	17·5	4·02	6·42	10·5	10·4	0·70	0·90	2·22	1·72	38·5	4·45	9·9	Ratio, A.M. : P.M. { Yield, 1·75 : 1. Fat, %, 1 : 2·35.
Lowest value recorded	13	8	2·05	3·10	8·6	8·5	0·36	0·40	1·12	0·71	22·0	2·60	8·7	Ratio, A.M. : P.M. { Yield, 1·10 : 1. Fat, %, 1 : 1·14

Average interval between Milkings—Night : Day=1·62 : 1.

TABLE XVIII.—COW No. 23. (GROUP I.) AGE, 7 years.

PERIOD OF LACTATION (to July 18), 69 weeks. WEIGHT on July 28, 11 cwt.

MEAN DAILY RESULTS.

PERIOD.	Milk yield.		Fat.		Solids-not-fat.		Total yield of fat.		Total yield of solids-not-fat.		Mixed morning and evening milk.			REMARKS.
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	Yield.	Fat.	S-N-F.	
	lb.	lb.	%	%	%	%	lb.	lb.	lb.	lb.	lb.	%	%	
I. July 18–July 24	18·5	13·3	2·73	4·20	9·2	8·8	0·51	0·56	1·70	1·17	31·8	3·35	9·0	Received daily— 2 lb. undecorticated cotton-cake. 2 " decorticated " "
" 25– " 31	17·9	13·1	2·84	4·23	8·8	8·9	0·51	0·56	1·57	1·17	31·0	3·45	8·8	
Aug. 1–Aug. 7	18·9	13·3	3·03	4·23	8·8	8·8	0·57	0·56	1·66	1·17	32·2	3·55	8·8	
Daily average for whole of Period I. (3 weeks)	**18·40**	**13·24**	**2·87**	**4·22**	**8·9**	**8·8**	**0·530**	**0.559**	**1·646**	**1·171**	**31·64**	**3·45**	**8·9**	RATIO, A.M. : P.M. { Yield, 1·39 : 1. Fat, %, 1 : 1·47.
II. Aug. 20–Aug. 26	17·3	12·9	2·76	4·62	8·8	8·7	0·48	0·59	1·52	1·12	30·2	3·55	8·8	Food as in Period I. Live-weight decrease (July 28-Sept. 9) 18 lb.
" 27–Sept. 2	16·6	12·1	2·91	4·85	8·7	8·7	0·48	0·59	1·45	1·04	28·7	3·75	8·7	
Sept. 3– " 9	15·4	11·9	2·91	4·91	8·7	8·7	0·45	0·58	1·35	1·04	27·3	3·80	8·7	
Daily average for whole of Period II. (3 weeks)	**16·45**	**12·26**	**2·86**	**4·79**	**8·7**	**8·7**	**0·472**	**0·588**	**1·436**	**1·069**	**28·71**	**3·70**	**8·7**	RATIO, A.M. : P.M. { Yield, 1·31 : 1. Fat, %, 1 : 1·67.
III. Sept. 19–Sept. 25	13·6	9·9	3·29	5·07	8·9	9·0	0·45	0·50	1·21	0·90	23·5	4·05	8·9	Food as in Period II., with addition of 4 lb. decorticated cotton-cake. Live-weight inc. (Sept. 9-Oct. 9) 68 lb.
" 26–Oct. 2	13·0	9·4	3·45	5·07	8·8	9·0	0·45	0·48	1·14	0·85	22·4	3·90	8·9	
Oct. 3– " 9	12·6	8·5	3·58	5·32	9·1	9·1	0·45	0·45	1·14	0·78	21·1	4·30	9·1	
Daily average for whole of Period III. (3 weeks)	**13·07**	**9·29**	**3·44**	**5·15**	**8·9**	**9·0**	**0·450**	**0·478**	**1·165**	**0·839**	**22·36**	**4·15**	**9·0**	RATIO, A.M. : P.M. { Yield, 1·41 : 1. Fat, %, 1 : 1·50.
Highest value recorded	21·0	15·0	4·3	6·0	9·6	9·3	0·69	0·70	1·83	1·33	34·5	4·5	9·4	RATIO, A.M. : P.M. { Yield, 1·67 : 1. Fat, %, 1 : 2·10.
Lowest value recorded	12·0	8·0	2·2	3·8	8·4	8·5	0·32	0·39	1·07	0·73	20·5	3·3	8·5	RATIO, A.M. : P.M. { Yield, 1·15 : 1. Fat, %, 1 : 1·10.

Average interval between Milkings—Night : Day = 1·51 : 1.

TABLE XIX.—CLASSIFICATION OF "BULK" SAMPLES (3 SERIES, 1903-4-5) ACCORDING TO PERCENTAGE OF FAT.

Month	Number of days on which samples were taken.	MORNING.						EVENING		WHOLE DAY	
		PERCENTAGE OF FAT.									
		Below 2·7	2·7–2·8	2·8–2·9	2·9–3·0	3·0–3·5	Above 3·5	3·5–4·0	Above 4·0	3·0–3·5	Above 3·5
						1905.					
July .	14	2	2	4	1	5	...	11	3	14	...
Aug. .	31	1	3	7	7	13	...	8	23	21	10
Sept. .	30	...	...	...	1	25	4	...	30	...	30
Oct. .	9	...	...	...	...	4	5	...	9	...	9
						1904.					
June .	24	5	5	1	1	12	...	8	16	21	3
July	31	1	4	8	9	9	...	5	26	22	9
Aug. .	31	1	1	7	6	16	...	12	19	22	9
Sept. .	9	...	...	...	1	7	1	...	9	2	7
						1903.					
June .	21	4	5	5	2	5	..	12	9	17	4
July .	30	1	2	6	13	8	...	4	26	16	14
						TOTALS FOR THE THREE SERIES.					
June .	45	9	10	6	3	17	...	20	25	38	7
July .	75	4	8	18	23	22	...	20	55	52	23
Aug. .	62	2	4	14	13	29	..	20	42	43	19
Sept. .	39	...	...	...	2	32	5	...	39	2	37
Oct. .	9	..	..	...	...	4	5	...	9	...	9
Total .	230	15	22	38	41	104	10	60	170	135	95

CORRECTION.

"Milk Investigations at Garforth, 1904."
(Trans. 1905, xvii. pp. 296–349.)

Table XXVI. (p. 348) should read as follows:—

TABLE XXVI.—Showing Total Yield of Milk, Fat, and Solids-not-Fat given by each Cow during the whole Experiment (95 days).

Cow No.	Total milk-yield.	Fat.		Solids-not fat.	
		Total weight.	Per cent.	Total weight.	Per cent.
	gallons.*	lb.		lb.	
2	358·4	122·1	3·41	315·3	8·8
5	210·3	78·6	3·73	186·6	8·9
6	226·3	93·7	4·14	204·3	9·0
7	299·6	102·2	3·41	266·9	8 9
8	279·9	91·2	3·26	249·5	8·9
9	283·0	94·9	3·36	248·1	8·8
10	214·9	78·7	3·66	190·1	8·9
12	262·6	81·9	3·12	223·6	8·5
14	356·2	120·9	3·39	314·0	8 8
15	281·3	86·6	3·08	247·7	8·8
16	262·1	102·2	3·90	244·8	9·3
17	270·4	75·4	2·79	241·4	8·9
19	315·3	108·8	3·45	281·4	8·9
23	343·8	119·4	3·47	303·2	8·8
Total for 14 cows (95 days)	3964·1	1356·6	3·42	3516·9	8·9

* 10 lb. = 1 gallon.

The corrections do not in any way affect the rest of the report.

THE POTATO CROP.

By DAVID YOUNG, Editor, 'The North British Agriculturist.'

THE potato crop is one of the most important of all in the rural economy of the United Kingdom. The potato is an esculent which is largely used and highly relished as an article of diet by rich and poor alike. The very poorest of the population find it one of the cheapest forms of sustenance they can obtain, and no well-ordered banquet, however sumptuous, would be considered complete without the *rôti-bœuf* and the *poulet* being flanked by the *pommes de terre.*

The potato crop is practically the one farm crop grown primarily for human food of which the United Kingdom can in ordinarily favourable seasons supply the wants of its teeming population.

The potato crop is not at all fastidious as to the soil in which it is grown, provided the soil be properly cultivated and manured, and in practically all classes of soil, excepting the stiffest clays, this crop may be successfully grown. It is a "dual purpose" crop, and though grown primarily for table use, it can be very successfully used to supplement the other feeding-stuffs available for stock-feeding. It is a crop which in favourable seasons generally yields a larger money return than any other of the regular crops of the farm, and frequently it yields a money return which is vastly in excess of that obtained from any other farm crop.

In respect of money return this is a very speculative crop, and as farmers generally like a bit of legitimate speculation they have ample opportunity of gratifying their speculating proclivities in the growing of potato crops. In fact this is the one staple farm crop which varies widely in price per ton from year to year. Owing to heavy and regular importations of grain and meat from colonial and foreign countries, the variations in the price of grain, and in the selling or letting value of roots, are confined within very narrow limits nowadays. But the price of potatoes from year to year shows a wide range of variation; one year they may be at 30s., while next year the price may range from £4 to £6 per ton. One year the potato crop may yield the grower a very modest return, whereas the very next year a potato crop of the same weight per acre may yield a money return twice as great as that of the previous year, and twice, or even three times, as great as that of any other crop of equal area on the farm. But even in seasons which have been favourable for the crop, so that the yield is heavy and the prices are low, the money return per acre from the potato crop is generally greater than that obtained from any other crop of the farm.

From a national point of view a full and sound crop of potatoes is always to be desiderated, as it places a staple article of diet before the public at a cheap rate, and saves to the country the money that would otherwise have been expended in paying for imported supplies. It is no wonder, therefore, that the importance of the potato crop is fully realised not only by arable farmers, but also by the public in general.

Areas and Values.

The area under this crop in the United Kingdom varies from year to year, but averages about 1¼ million acres per annum. Last year (1905) the area under this crop in the United Kingdom was officially returned by the Board of Agriculture as follows: England, 434,773 acres; Wales, 29,435 acres; Scotland, 144,265 acres; and Ireland, 616,755 acres,—the grand total for the kingdom being 1,236,768 acres. From these figures it will be seen that Ireland, although its total area is only slightly larger and its population is less than that of Scotland, has a larger area under this crop than is to be found in the whole of Great Britain. This fact is of much importance, in view of the recent great developments of potato-growing in Ireland, which will be referred to later on. It has further to be noted that the official statistics quoted above refer only to field potato crops, and do not include the potato crops grown in gardens or on allotments.

The official estimate of the average yield of the potato crops is returned at slightly under 6 tons per imperial acre. It is not easy knowing how this official estimate of the average yield of the potato crop has been arrived at, for it would be difficult to meet any grower who, in an average year, would admit that his crop only showed a yield of 6 tons of "ware" or dressed potatoes per acre. Certain it is that on the richer and well-cultivated soils crops of 7 to 10 tons of dressed potatoes per acre are quite common, and even on lands which are naturally poor, but have been well cultivated and well dressed with natural and artificial manures, these yields are not uncommon.

In a year of full crops and low prices the money value of the potato crop to the farmers of the United Kingdom may range from 15 to 20 millions sterling, whereas in years when the home supply is rather less than the demand, and the Continental crop is under the average, the money value of the home crop may easily run to double these figures. In fact the money value of the potato crop of 1904—when prices during the following winter went up to £5 and upwards per ton—was computed by competent authorities at 40 millions sterling.

Potato Areas in other Countries.

It is not only, however, in the United Kingdom that the potato is largely grown as a field crop. On the contrary, this crop is largely grown in the temperate zone of both hemispheres. The German crop of potatoes is a most important factor to be reckoned with in our home markets, as every intelligent grower knows—for the area annually under this crop in the "Fatherland" bulks up to close upon 8,000,000 acres, and the official estimate of the average yield per acre of the German crop is only slightly under that for the British crop. Potatoes are largely used for food by the German people, and particularly by the peasantry.

Whenever there is a shortage in our home supplies, and the German crop is up to the average, the enterprising Teuton is ready to avail himself of the "open door" to our markets, and to share his last tuber with the English buyer, so that the upward movement in prices is greatly affected by that cause. A large proportion of the German crop, particularly in the western provinces, is regularly used for distillation, the resultant alcohol or potato spirit being used as a source of motive power. A very large amount of that potato spirit—or Berlin spirit as it is called—is also imported into this country, where part of it is used for fortifying "weak" wines; but by far the larger proportion is, by a subtle process of alchemy, converted into "Fine Old Highland Malt Whisky."

In the vast dominions of the Czar of all the Russias the area annually under potato crops bulks up to over 9,000,000 acres; but, of course, few, if any, potatoes from Russia are ever found in the English market. Austria-Hungary shows an area of about 4,000,000 acres under potatoes, and France shows a similar area. A considerable proportion of the French crop is used for the manufacture of starch as well as for distillation.

A considerable quantity of early potatoes from France come to the English market, and the quantity of late or maincrop potatoes sent from France is regulated by the prices in the respective markets. Belgium, Holland, Denmark, Norway, and Sweden all show relatively large areas under this crop.

In the United States the area under this crop annually averages about 2½ million acres, and in Canada the area under potatoes annually averages about 180,000 acres. In the Argentine the area under this crop is rapidly increasing and now reaches about 100,000 acres. In Algeria, South Africa, India, Australia, and New Zealand there are considerable areas under this crop. The potato may therefore well be called the cosmopolitan esculent.

Early History of the Potato.

In the early history of potato-growing in this country there are many points that might be recalled here with interest and edification. Unfortunately this cannot be done within the limits of the available space. From its native habitat in the high-lying lands of Chili, where it is found growing wild, the potato found its way to Spain, and also to the United States. In 1584 Sir Walter Raleigh brought it to Ireland from Virginia. There is evidence to show that within a comparatively few years thereafter the potato was cultivated—at least as a garden crop—to some considerable extent in Ireland and also in Lancashire. But in mostly all the other parts of the kingdom the progress of potato culture during the next two centuries was very slow. The methods of cultivation then followed were of the most primitive order, and the resultant crops were probably not so bountiful as to rouse the enthusiasm of the cultivators. In the statistical account of Scotland it is recorded that potatoes as a field crop were first grown in the county of Stirling, and that they were not known in the Highlands and Islands till 1743.

But if in the first two centuries the progress of potato culture was very slow in the United Kingdom, a different state of matters prevailed in the early part of the nineteenth century. By that time the valuable, or rather we should say invaluable, properties of the potato crop had been fully realised, and its culture on a large scale was the order of the day throughout the country. The plan of producing new varieties from the seeds in the "plums" or "apples" was well understood also, and early in that century there were numerous different varieties in general cultivation. The famous wholesale seed firm of Messrs Peter Lawson & Son, Edinburgh, which still retains its pristine eminence in the Scottish seed trade, were then devoting great attention to potato culture, and in the agricultural museum, which was located in the chambers owned and occupied by the Highland and Agricultural Society, they had specimens of over 100 different varieties on exhibition.

It is also interesting to note that the national Agricultural Society of Scotland was a pioneer of progress in potato culture. In 1827 the Society awarded a medal to Mr Richard Lowthian Ross of Staffold Hall, Cumberland, for bringing out a new variety of potato called Staffold Hall, which that gentleman "had grown successively on a deep rich soil, approaching clay, for a long period, and had never found it to present the least symptom of curl or disease of any kind, either on its foliage or tubers, and its produce per imperial acre he has found in several instances to exceed 30 tons."

In the premium article by Mr Peter Lawson on "The Comparative Value of Different Varieties of the Potato," published in vol. ix. of the Society's 'Transactions,' it is recorded that "the Staffold Hall, or Late Wellington as it is sometimes termed, was found superior in specific gravity and quantity of starch contained in a given weight of tubers to any of the others there enumerated, amounting to seventy-three." It would rather seem that if a potato answering the description of the Staffold Hall were to be brought out nowadays it would be hailed with universal acclamation as the very kind that potato-raisers and potato-growers had for many long years been looking for and striving to obtain.

In the 'Agriculturist's Manual,' published in 1836 by Messrs Peter Lawson & Son, "Seedsmen and Nurserymen to the Highland and Agricultural Society," there is given a list of 146 different varieties in ordinary cultivation, and full particulars are given respecting each variety under the different heads of "Habit of growth," "Foliage," "Flower," "Shape of tubers," "Colour and other peculiarities of skin," "Fold of increase," "General remarks," and "Weight of starch in 1 lb. of tubers." From these "General remarks" we learn that some varieties were then marked as "healthy," "pretty healthy," or "very healthy," while others were marked as "unhealthy" or "very unhealthy," and quite a number were marked as "subject to curl" or "very subject to curl." The "weight of starch in 1 lb. of tubers" was found to vary immensely in the different varieties, the range of variation being from 408 to 903 "grains troy." Two varieties—namely, the Sawyer's Red and the Late Jersey—were found to show 903 grains troy of starch for 1 lb. of tubers, but both these varieties were branded as "rather waxy and indifferent in flavour." It may be interesting to quote from this list some particulars respecting a number of varieties which, as some veteran growers will recollect, were largely grown in the early 'Forties.

Name.	Fold of Increase.	General Remarks.	Weight of starch in 1 lb. tubers. Grains troy.
Staffold Hall . .	22	Very mealy, very superior flavour, very healthy	813
Crops	20	Mealy, good flavour, very healthy	687
Buffs	15	Mealy, superior flavour, very healthy	466
Perthshire Reds .	15	Mealy, good flavour, healthy	777
Fife Blues . . .	16	Mealy, good flavour, pretty healthy	529
Edinburgh Dons .	16	Mealy, good flavour, pretty healthy	576
Blue Dons . . .	15	Mealy, very good flavour	547
Leather Coats . .	13	Mealy, superior flavour, healthy	790

It is worthy of note also that in those early days the intelligent growers of potatoes were possessed of a good deal of knowledge which is frequently supposed to be the product of modern experiment and experience. Thus we find in the first edition of Johnson's 'Dictionary of Modern Gardening' that the plan of sprouting seed tubers in trays or boxes for the growing of early potatoes was well known and widely practised, particularly in Cheshire, "where they are celebrated for the early production of potatoes." The same authority was also very emphatic in regard to the importance of using fairly full-sized uncut tubers for seed, and of conserving the first sprout of the seed by way of preventing the loss of stamina inevitably caused by the breaking of the first sprouts; and he was equally emphatic in regard of using potatoes that had been brought from a district that was higher and colder than that in which it was to be planted. It was also known in those early days that tubers which had been harvested before being fully matured were better adapted for seeding purposes than those which had been fully matured before being harvested. When it is added that in those early days the average yield of the crop was eight tons per acre, or quite two tons more than the official estimate of the crop nowadays, it will be seen that these potato-growers of seventy years ago were not so very far behind.

'46 *and After.*

The year 1845 was a fateful one in the history of potato-growing. In that year the dreaded disease *Phytophthora infestans* wrought sad havoc among the potato crops throughout the country. "The disease," as it is called by potato-growers—other diseases in potatoes are always indicated by a specific name, but this one is "the disease"—was by no means a new pest, for, according to numerous old records, it had year by year done more or less damage to the potato crops of the United Kingdom and the Continent. But the disease had rarely, if ever before, been so virulent as it was in 1845. But worse was yet to come, and in the following season, which was wet and ungenial, the disease fell like a pestilence on the crops and practically ruined them. The ruin of the potato crop of that year had one most important permanent effect on the agriculture of the kingdom, for it led to the abolition of the protective duties, which had up till then been levied on all food-stuffs imported from abroad.

The potato-growers of Great Britain suffered heavy financial loss through the failure of the crop in 1846, and for a time they lost confidence in their own ability to fight the battle against the dreaded disease, so that the area under this crop was for some years greatly reduced. But just as a crisis of any sort in public affairs usually brings to the front some strong man capable of dealing with it, so this crisis in the history of the potato-growing industry in the United Kingdom brought to the front a man who rendered incalculable service to his country and his fellow-men. This was William Paterson of Dundee.

As a market-gardener and potato-seed grower on a large scale Mr Paterson had been experimenting for twenty years previously in the raising of new varieties of potatoes; but all the new varieties which he had brought out prior to 1846 had gone down before the disease, like all the others in that disastrous year. But the failure of his exertions in that way only caused him to redouble his energies, with the fixed determination to discover the means of either preventing the scourge altogether or at least of checking its ravages to a material degree. With the zeal of a devotee he set himself to investigate the nature and cause of the disease, while carrying on at the same time his experiments in the way of raising new varieties which should show sufficient constitutional vigour to hold the disease at bay.

For several years Mr Paterson worked on with little success and less encouragement, but at length, in the second half of the 'Fifties, he brought out the "Paterson's Victoria," which proved to be not only a splendid cropper of excellent quality, but practically immune against the disease. The success of the "Victoria" was immediate and outstanding, and very soon it was largely grown all over the country. The late Queen Victoria wrote with her own hand a letter to Mr Paterson ordering a quantity of Paterson's Victorias for planting on the Royal farms at Windsor, and that letter is one of the most treasured possessions of his family to this day. By way of doing honour to the man whom the Queen had thus delighted to honour, the landowners and farmers of Forfarshire presented him with a solid silver epergne and a claret jug, which are also carefully treasured in the family.

In his "Report on Experiments in Propagating New and Superior Varieties of the Potato Plant," for which he was awarded the gold medal of the Highland and Agricultural Society in 1869, Mr Paterson tells the story of his long-continued and costly struggle to produce a variety which should be distinguished by its heavy-cropping, good-cooking, and disease-resisting qualities. From this report, which is published in the Society's 'Transactions' of 1870, we quote the following extract:—

"My own conviction regarding the potato blight is that there is no direct cure for it, but that it is entirely owing to atmospheric action in the plant, and that it will be always more or less subject to it. From this time (viz., 1853) I determined on carrying out my original idea of raising and improving seedling varieties from the plum or apple of vigorous and healthy tubers. The initial difficulty was very great. Potatoes in this country had almost ceased to flower, and at considerable expense I imported them from England, the Cape of Good Hope, Australia, America, and Calcutta, from which, as well as from our own standard kinds, I selected the healthiest tubers and planted them in a field of newly taken in land, with reed manure, by the side of a stream where the atmosphere was damp. All produced flowers, and most of them apples. The experiment was successful, and from the seed or apple I produced those new and improved varieties which I have now given to the public, and which are acknowledged to be at home and abroad of so much benefit to the community."

As already noted, the success of Paterson's Victoria, and several other new varieties raised by him in the way described above, was remarkable and immediate. But the scientific methods of "booming" new varieties of potatoes were not known in his days, and Mr Paterson himself was more concerned about doing an incalculable and permanent service to his fellow-men than he was about using even legitimate means of snatching a chance of making a fortune for himself; and notwithstanding all the tokens of public appreciation bestowed on him by the Queen and his fellow-agriculturists, he actually was a heavy loser financially through his efforts to bring out a potato which should realise his ideal.

Hybridising Potatoes.

It is claimed that Mr Paterson, the raiser of the Victoria, was the first to hybridise or cross-fertilise different varieties of potatoes. It is impossible to say whether that claim be well-founded or not, for some of the older writers refer in a vague way to crossing different varieties of potatoes, and Mr Paterson, in his report to the Highland and Agricultural Society, makes no specific mention of hybridising. But as the science of botany was well understood in his day, and as he devoted so much attention and skill to the propagation of different varieties, it is quite likely that he followed the principle of cross-fertilisation. It may be well, therefore, at this stage to give a brief account of the system which is now so largely followed in the cross-fertilisation of potatoes.

It will be noted that Mr Paterson in his report to the Highland and Agricultural Society says that, before he got on to the line of experiment which led up to the production of the Victoria, "potatoes in this country had almost ceased to flower," let alone bearing "apples" or "plums." Whether that was due to the loss of constitutional vigour, or to the fact that through the process of selection the varieties which expend all their energies on the production of tubers and not on the production of "apples" had come to be the only kind generally grown, cannot now be determined. And here we may note a somewhat remarkable fact in this connection. Many years ago Mr John Wilson, Chapelhill, grew a variety of potatoes which regularly produced a full crop of "apples." Mr Wilson came to the conclusion that the plants could not possibly produce such a heavy crop as they could otherwise do if a great part of their energy was expended in the production of "apples," and by way of experiment he set his "hands" to snip the blooms off the plants in a few acres situated in the centre of the field. The result was that the part of the field so treated yielded a crop which was quite two tons per acre heavier than that yielded by the same variety in the other parts of the field which were not so treated. But in the evolution of heavy-cropping varieties "apple"-bearing varieties are now very few and far between.

The Process of Hybridising.

The scientific process of hybridising is depicted in the series of photographs which are given herewith, and have been specially prepared by Messrs Sutton & Sons, Reading, for the illustration of this article (figs. 3, 4, 5, 6, and 7). The anthers have first of all to be removed at an early stage of the flowering process in order to prevent the pollen produced on them from lighting on the pistil. Care must also be taken to prevent the pollen of any neighbouring plants from lighting on the pistil of the plant to be impregnated. Then the pollen collected from the anthers of the plant to be used as the "male" in the crossing process has to be dusted on the pistil which is to be impregnated. Care must also be taken that no other pollen is allowed to get near that pistil. Some hybridisers

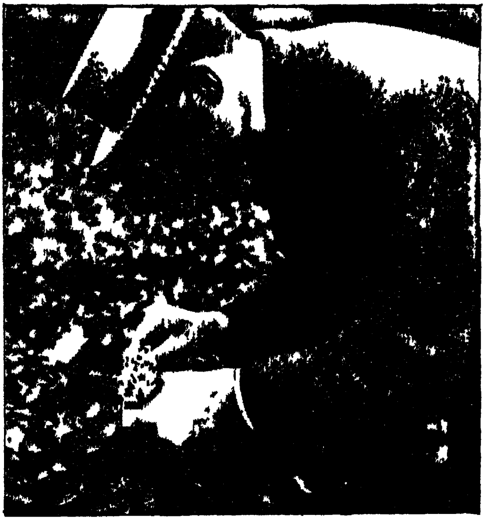
Fig. 3.—*Collecting the pollen.*

put a glass vase over the cross-fertilised plant, and others follow the plan of tying a muslin bag over the pistil for the same purpose.

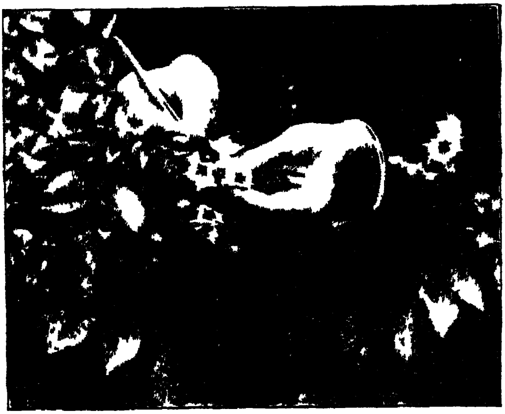

Fig 4.—*Removing anthers previous to fertilising.*

Fig 5.—*In the act of fertilising.*

One difficulty that often confronts the hybridiser is that the plant he wants to use as a "male" may not be in bloom at the time that the plant he wants to use as a "female" is ready for the impregnating process. Another difficulty is that, owing to the "apple"-bearing capacity having been almost entirely "bred out" of the heaviest cropping varieties, the plant may not produce any "apples" though the pistil has been duly impregnated. The taking off all the blooms but the one to be impregnated has a marked effect in the way of making the plant produce "apples" Some hybridisers pick away the growing tubers from the roots for the purpose of causing the plant to expend its energy in the production of "apples" in place of tubers. With all these devices, however, the hybridiser may pollinate twenty different blooms, and consider himself very lucky if he gets "apples" on one or two of them. When the "apples" are full-grown they are gathered and the seed washed out from the surrounding juice, each "apple" containing from 100 to 300 seeds.

The seed are sown in fine rich mould in a greenhouse in the early spring, and after they have brairded the young plants are planted out in the garden or elsewhere. Each of these transplanted plants will produce a few tubers, mostly all of small size. The first year's seedlings are not invariably of small size, however. Thus at the first show of the National Potato Society at London in 1904, the Sir John Llewellyn Challenge Cup for the best collection of potatoes was awarded to Messrs Sutton & Sons for a collection of 50 different varieties, which included a selection of seedlings grown direct from the "apple"-seed in the same year, these seedlings being for the most part of quite the size ordinarily obtained from the planting of full-sized "sets." Last year also Dr Wilson, the lecturer on agriculture at St Andrews University, who has devoted much attention to the scientific hybridising of farm plants, had an "apple"-seed

Fig. 6.—*A closer view of the act of fertilising.*

Fig. 7.—*Berries four weeks after fertilisation.*

planted in March which in October showed a yield of 6 lb. 1 oz. of fairly full-sized tubers.

The tubers of the seedlings in the first year from "apple"-seed generally show a great variety of type, and even of colour, "blues" and "reds" being quite common in first year's seedlings, even from seed produced by the cross-fertilising of two white-skinned and white-fleshed varieties. Then the process of selection begins, and has to be continued for several years until the types selected are properly fixed. A vast amount of patience is required for this work, as very frequently a seedling which gives great promise in its second, third, or even fourth year has eventually to be discarded on account of its failing to come up to the promise of its earlier years.

The Champion and the Magnum.

The Victoria, and other new varieties brought out by Mr William Paterson, "held the field" for a good many years, but in process of time they began to lose their pristine vigour, just as every variety does in time. There were others, however, who took up the work that Mr Paterson had expended so much zeal upon, and one of the most notable of these workers was Mr John Nicol, then of the Ochterlony Gardens, Forfarshire, who in the early 'Seventies brought out the Champion, which was a heavy cropper of fair quality and had great disease-resisting power. In the course of a few years this variety was very largely grown in Scotland as well as in Ireland.

Early in the 'Seventies also a number of new varieties were imported from America, and from one of these—the Early Rose—crossed with Paterson's Victoria, there was produced the Magnum Bonum, which was brought out by the Messrs Sutton in 1876. The Magnum Bonum was a capital cropper, of excellent quality and great capacity for resisting disease. In a short time it took the leading place among all the varieties grown in England.

A series of wet seasons, culminating in the disastrous season of 1879, wrought great havoc among the crops of the country, particularly in England. A Departmental Committee was appointed to investigate the whole question of producing new varieties, and they recommended that Parliament should initiate and subsidise experiments designed to produce new and disease-proof varieties; but this recommendation was never acted on. Lord Cathcart, in commenting on this report, states that—

> "All potatoes have degenerated in their disease-resisting powers. A variety from seed takes four to six years for its establishment, and under the most favourable circumstances a good variety may be expected to

degenerate in twenty years. The production of new varieties is of national importance."

Through the influence of Lord Cathcart, Mr J. G. Baker, the eminent botanist, was led to make an exhaustive study of the genus *Solanum*, in order to advise as to the relation of the cultivated varieties to the various wild species found in the American continent, preparatory to hybridising experiments in which these wild species might be used. As a result of his investigations, detailed in his 'Review of the Tuber-Bearing Species of Solanum,' he recommended the crossing of the cultivated varieties with the Darwin potato, *Solanum Maglia*, from the Chonos Archipelago, and the Uruguay potato, *Solanum Commersoni.* Lord Cathcart furnished specimens of the *S. Maglia* to the Messrs Sutton for crossing purposes, but the produce obtained from crossing the best cultivated varieties with the *S. Maglia* were far behind in appearance, crop, and quality. The cross with the *Commersoni* was attempted year after year, but without success.

During these years of investigation and experiment, however, the hybridiser, like the schoolmaster, had been abroad. Many excellent new varieties were brought out by the Messrs Sutton, whose name is synonymous with excellence and quality in every department of farm and garden seeds. Numerous other enthusiasts in the same line added their quota to the national stock, but all through the 'Eighties the Champion and the Magnum continued to hold the leading places. But in England in particular the crops were often very disappointing. The English growers had not then learned the lesson so well known by the early Scotch growers of getting a change of seed from the colder and later climate of Scotland.

Mr Findlay's New Varieties.

In the end of the 'Eighties public attention began to be attracted to the new varieties raised by Mr Findlay, then of Markinch, Fifeshire. His first success was The Bruce, which gave excellent results for a time. Later on he followed with the Up-to-Date and the British Queen, both of which were excellent varieties. At one time it seemed as if both these varieties would have to be discarded on account of disease, but they seemed to recover their vigour and reputation. In fact, the Up-to-Date, though it has now been before the public for some fourteen years, is still probably the variety most largely grown throughout the country. Shortly after it was brought out it was grown on a large scale on Lord Rosebery's home farms at Dalmeny, and the enormous crops of "Dates" then produced—which certainly were grown on exceptionally excellent and lavishly-manured soil—helped greatly to bring the "Date" into public favour. The Langworthy, brought out by Mr Niven of Madderty, Crieff, about the same time as the Up-to-Date, is a variety of exceptional cooking quality, but is not so heavy a cropper, though it generally commands a higher price per ton. Other varieties, such as the Scottish Triumph (raised by Mr Gemmell, Flakefield, Hamilton), the Crofter and the Factor (raised by Mr Chapman, Bathgate), the Dalmeny Hero (raised by Mr John Hunter, F.I.C.), and many others, have their backers as the maincrop varieties most approved by them.

The Potato Boom.

So matters stood at the end of the nineteenth and the beginning of the twentieth century. Then there was brought about the great Potato Boom, which may well take its place in history along with the South Sea Bubble. The circumstances at the time were all in favour of those who worked up the boom, for in 1902, and still more so in the following year, the season was very unfavourable for the potato crop in the United Kingdom as well as on the Continent, so that prices for sound tubers ruled high; and those who were fortunate enough to have large and sound crops—as many of the farmers in Scotland were—reaped a golden harvest in each of these years. As the boom is so recent, and its salient points are so well known, there is no need to go into any details of its history here. The methods and agencies by which it was worked were those so well known and so frequently resorted to by the Bulls and the Bears of the Stock Exchange. In the centre of the boom were two new varieties, which were declared to be immense croppers and practically immune against the disease. During the winter of 1902-1903 prices for one of these varieties were forced up to an unprecedented level. But at the end of the following season, when disease was again very prevalent and prices for sound tubers were abnormally high, a perfect frenzy for new varieties seemed to seize upon growers. Day by day and week by week the reading public were informed that some prominent grower or other had bought a tuber of one of these new varieties at £20, £50, or £100, and as these reports increased the delirium of buyers increased. Some of these reported purchases of tubers at more than their weight in gold were undoubtedly genuine; and in a lawsuit regarding the non-delivery of a stone of one of these new varieties in the spring of 1904, evidence was led to show that three pounds of that precious stone had been sold beforehand at £160 per lb.! The public appetite for new varieties seemed to be insatiable at the time, and scores of "new" varieties—most of which were old friends with new names—were rushed upon the market and eagerly snapped up at fabulous prices by growers.

Even at the termination of the planting season of 1904 the delirium had not subsided. The boomers had still another arrow in their quiver, and they shot that shaft with far-reaching aim. Miles of greenhouses were rushed up for the purpose of "forcing" tubers of the £160 per lb. variety, and the public were conjured to buy "shoots" or sprouts of that and other varieties at 4 guineas each. Thousands of farmers and gardeners who could not afford to buy a pound of tubers at £160 per lb. rushed to buy these precious "shoots" at from 2 to 4 guineas each. One developer boasted that he had taken 1000 shoots from a single tuber, so that if he had sold all these at an average of 3 guineas each he had made £3000 off a single tuber, and had that precious tuber left to grow a further crop with!

But the potato harvest of 1904 found the growers of new and high-priced varieties in a very different frame of mind. The precious "shoots" which they had bought at from 2 to 4 guineas apiece had each and all of them yielded a caricature of a crop, as the merest tyro in botanical science and farm practice could have told them would be the case. Most of the new, or so-called new, varieties had also proved to be quite as susceptible to the disease as the older varieties. And above all, the general crop of the country was a very full one, so that prices ruled very low. Then there was a rush to sell for seed the stocks which had been bought at fabulous prices, but the demand had gone off and the slump came. The following year —1905, that is—was also a favourable one for the potato crop, and on account of the heavy yield prices were low. The "new" varieties rushed upon the market two years before had, as a rule, proved no better than any of the well-tried standard varieties, and some which were undoubtedly new varieties developed a fatal facility for going wrong in the pits, though they looked quite sound when lifted. The result is that at the present time potato-growers are greatly at a loss as to what variety they should plant, and they are cautious, even to the verge of suspicion, as to the purchase of any new variety whose merits as a cropper and disease-resister have not been fully proved on a large scale, and for at least a couple of years.

Recent Progress in Ireland.

But while the Potato Boom was being shot up by scientific and other devices on its rocket-like course, there were scientists in Ireland engaged in experimental work which was destined to be of great and permanent interest to potato-growers. The

Department of Agriculture and Technical Instruction for Ireland—a Board backed with ample funds and staffed with able and energetic men—had been most successfully carrying on a great work for the advancement of the agricultural and other industries of Ireland. That experimental and demonstration work carried on by the Irish Department was destined to be of paramount importance to potato-growers in Great Britain as well as in Ireland. The potato crop covers such a vast area in Ireland, and is a staple food of the Irish peasantry, that the Department wisely devoted a great part of its resources towards the development of the potato-growing industry. The chief scientific adviser of the Irish Department is Professor J. R. Campbell, a young and very able Scotsman, who was formerly assistant lecturer on Agriculture at the Glasgow Agricultural College before being appointed Professor of Agriculture, first at the Lancashire Agricultural College, and afterwards at the Yorkshire College. Professor Campbell, while engaged as lecturer on Agriculture for the Glasgow Agricultural College, was well acquainted with the principles and practice so profitably followed by the skilful and enterprising farmers on the Ayr and Girvan coast, and other parts of the south-west of Scotland, in the growing of early potatoes for the early market, and on his being translated to Ireland he soon decided to make a vigorous effort in the way of stimulating the Irish growers to take up that same very profitable business, as Ireland, owing to its earlier and milder climate, was even better suited than the seaboard of Ayrshire for the production of early potatoes in the month of June, when prices for new potatoes are always at their highest.

Knowing full well the outstanding abilities of Mr Wallace, Terreglestown, Dumfries, as a highly successful grower of both early and maincrop potatoes, Professor Campbell secured in 1900 the services of Mr Wallace to deliver an annual course of lectures in Ireland, and supervise numerous experimental and demonstration areas for the Department in Ireland. This experimental and demonstration work proved a great success.

The system of sprouting seed tubers of the earliest varieties in boxes during the winter and planting them out early in spring, which was followed in Cheshire in the early part of the nineteenth century and has long been followed in Ayrshire and the west coast of Scotland, produced for the Irish growers a good crop which was ready for harvesting in the early part of June before even the Ayrshire crops were ready, and were all marketed at highly satisfactory prices before the time at which the disease makes its appearance, while a fairly full crop of roots, cabbages, or other produce could be afterwards grown on the same ground the same season. This was a new and very profitable venture for the Irish growers, and the system is spreading so rapidly in Ireland that the large quantities of early potatoes now annually shipped from Ireland to the British markets are very sensibly affecting the prices and profits realised by the growers on the Ayrshire and west coast generally. The official report of the Irish Department showed that the crops of early potatoes in Ireland last year had been all marketed at prices averaging over £30 per statute acre.

It was probably intended at first that the efforts of the Department in this direction should be concentrated on the development of the early potato-growing business. But the experimental and demonstration work of the Department broadened out into new fields of far-reaching importance. The crops of the earliest varieties of potatoes, when the seed tubers are sprouted in boxes and planted early in early districts, are usually marketed before the disease begins to make its appearance in the fields. For some years the Irish Department had made an exhaustive series of experiments in spraying the late or maincrops with *Bouille Bordelaise* or sulphate of copper solution, and had proved up to the hilt that this system was of incalculable value in either altogether preventing or at least very materially checking the ravages of the disease. Professor Campbell and Mr Wallace came to the sound conclusion that no variety of potato which was then on the market, or was ever likely to be on the market, was proof against the disease, and that while it was very desirable to give a preference to those varieties which showed the greatest power in resisting the disease, provided their flavour and yield were satisfactory, yet the best plan of preventing or checking the ravages of the disease was to systematically follow the plan of spraying. Mr Wallace also well knew the old fact which had been stated in the 'Dictionary of Modern Gardening' sixty years before, but had been practically forgotten by growers in the second half of the nineteenth century—namely, that it was not only most desirable to plant good-sized seed, preferably uncut, but it was also of the first importance to preserve the first bud of the seed tuber in order to provide against loss of stamina in the plant through breaking off the shoots. He therefore proceeded to prove by demonstration on the field what he had previously proved in his own practice at Terreglestown, that it was a most profitable plan to have the seed of even the late or maincrop potatoes sprouted in boxes during the winter, as was done in the case of the early varieties for the early market.

The first Irish experiments in this direction in 1902 were very conclusive, as the crops of good-sized seed tubers which had been sprouted in boxes, and had their sprouts toughened by exposure to light and air before being planted, were not only much larger in yield but were much freer from disease than those which had not been so treated, but had got their first shoots broken off by handling at the time of planting. The Department's experiments showed that over all the numerous fields on which these tests as between "boxed" and "unboxed" seed had been conducted, the average increase in yield obtained from the "boxed" seed was over 2½ tons per statute acre. A similar experiment conducted in the following year at the Yorkshire College farm showed precisely similar results, and attracted much attention in England. Year after year similar experiments were conducted in Ireland by the Department, and in every year the results have been practically the same.

Further experiments conducted by the Department proved that not only was there a great increase in yield obtained from "boxed" as against "unboxed" seed, but that the system of spraying with the sulphate of copper solution, if efficiently and timeously carried out, had not only a most marked effect in preventing or checking disease, but that it had also a most marked further effect in prolonging the growing period of the crop, and in that way increasing the yield. Mr Wallace unhesitatingly and emphatically declared his settled conviction that, when once the Irish growers had learned to "box" and "spray," the Green Isle, with its potato area of 600,000 acres and its relatively small population of 4¼ million souls, would be able not only to supply the wants of its own people, but would also be able to regularly export enormous quantities to the British markets instead of requiring to import large quantities, as had often been the case in former years. The Irish Department have therefore concentrated their efforts on stimulating and encouraging the Irish cultivators to "box" and "spray," and the Irish growers have been quick to learn a lesson which promises to be so very profitable to them.

Last year the Irish growers who had learned to "box" and "spray" had very heavy and sound crops, and the total output of potatoes in the Green Isle was so heavy and plentiful that it is having a most decided effect, and keeping prices at a very low level in this country. There seems no reason to doubt that as more and more Irish growers are led to "box" and "spray," the crops grown on the vast area under potatoes in Ireland will be heavier year by year, and the effect of that on the prices in the home market will be keenly felt by British growers.

Seed from the North.

Within the last few years also another great change, which promises to increase the total average yield of the potato crops of Great Britain, has been taking place. The change in question was due to what may be called the rediscovery of a fact which was well known to the gardeners and other growers of potatoes more than half a century ago—namely, that in getting seed potatoes it was always desirable to get them from a colder and later district and climate than that to which they were taken. In comparatively recent years many English growers frequently obtained potato seed from Scotland, and found that in almost every case the seed tubers grown in Scotland yielded much better crops than those obtained from the use of seed grown in England. The greater yield of crop obtained through the use of Scotch-grown seed was, however, generally ascribed to superiority of variety, as the tubers taken south to England for seed were generally of a different variety from those previously grown. That, however, was not the correct explanation. Certain it is that, as a general rule, seed tubers grown in the colder and later climate of Scotland give much better results than tubers grown in the warmer and earlier climate of England. Several reasons may be adduced in partial explanation of this fact. For one thing, owing to the climate of Scotland being colder and later than that of England, the potato crop in Scotland is not usually so fully ripened when it is harvested as the potato crop in England is when harvested, and it is an old but recently rediscovered fact that potatoes harvested before being fully matured are much better for seeding purposes than potatoes which have, in a way, exhausted their vitality in ripening. For another thing, again owing to the climate of Scotland being colder and later than that of England, seed tubers taken from Scotland to England for seeding purposes are not usually so much sprouted as those in the warmer south at the same time of year, and consequently do not lose so much of their stamina and vitality through the breaking of sprouts in handling.

But over and above these considerations there is undoubtedly in the potatoes grown in the colder and more bracing climate of Scotland some subtle force which makes for greater constitutional vigour and habit of growth than are characteristic of those grown in the warmer and more relaxing climate of England.

In 1903 Professor Seton, at the Yorkshire College farm, carried out an experiment on this point, and found that seed grown in Scotland, when planted in Yorkshire, showed an increase of crop to the extent of 2 tons per acre, and was much freer from disease than the adjoining crop of the same variety grown from native seed. Much attention was attracted to these findings at the time; but since then they have been very fully confirmed, not only by the experience of hundreds of English growers, but also by scientific and careful experiments at practically all the agricultural colleges in England. At the Cambridge University farm Professor Middleton found that the crop from Scotch-grown seed was so vastly heavier than the crop from native seed of the same variety that he was fairly staggered at the result, and half inclined to doubt the accuracy of his own findings. At the Northumberland County Council farm of Cockle Park Professor Gilchrist found similar results, but found that these were only in accordance with the experience of growers seventy or eighty years ago.

At date of writing, the latest series of experiments recorded in this connection is a most exhaustive one from the Lancashire County Council farm, where four different tests, all in duplicate, were carried out with wonderfully uniform results, which led the experimenters to draw the following conclusion—viz., "seed potatoes brought from a northern to a southern latitude give a larger crop than those from a southern to a northern latitude, the difference, according to this experiment, being on the average about 3 tons per statute acre."

If the English growers not only learn to "box" and "spray" as the Irish farmers are learning to do, but also learn that "seed potatoes brought from a northern to a southern latitude" give a crop of 3 tons per acre more than English-grown seed, that will all make for a greatly increased average yield per acre in England and a comparatively lower range of prices per ton.

Resisting Disease.

As already noted, there is no variety of potato on the market which is not more or less susceptible to the disease, though undoubtedly some varieties show much greater capacity for resisting the disease than others. It is also a notorious fact that many of the new varieties of potatoes which have been put on the market within the last few years at fabulous prices, as being "practically immune against the disease," have proved to be quite as liable to succumb to the attack of the dreaded fungus as any of the well-proved standard varieties which have been before the public for a dozen years or more. Judging from the experience of the past century, it is not at all likely that a potato of good quality that will be disease-proof for any considerable number of years will ever be brought out.

It was reported from France last year that, after many unsuccessful efforts, a cross between the cultivated potato and the wild potato—*Solanum Commersoni*—had been brought out and gave every promise of high disease-resisting power, but that it was not well adapted for table use, as its cooking quality left much to be desired. It seems clear enough, therefore, that growers need not rush wildly after any so-called disease-proof new variety for protection against the *Phytophthora infestans*, but that they should follow the lead of common-sense and science in the prevention of the disease.

Planting good-sized tubers, whose first sprouts have been carefully preserved, is a most important matter in the way of maintaining the constitutional vigour of the plant. As a matter of course also, preference should be given to those varieties which show the greatest capacity for resisting the disease—that is to say, if their cropping powers and cooking qualities are up to the mark. For those who farm in the warmer and earlier climate south of the Borders, it is also a most important fact, as was urged upon the attention of growers seventy years ago, that seed potatoes should be brought from a colder and later climate than that in which they are to be planted. Seed tubers that have been harvested before being fully ripened are also to be preferred.

Spraying.

But over and above all these remedies dictated by experience and common-sense, there is the scientific plan of spraying the growing crops with the sulphate of copper solution by means of the Strawsonizer or any of the cheap sprayers now on the market. The success of the system of spraying as a preventive of disease has been proved beyond the possibility of cavil, and, as we have already noted, the Irish Department of Agriculture have strained every nerve to rouse up the Irish potato-growers to spray their potato crops as a preventive of disease and famine, the mild and humid climate of Ireland being of a kind that is favourable for the spread of the disease.

Innumerable growers have found also that not only has the spraying a most marked effect in checking the ravages of disease, but it has also the further effect of prolonging the growing period of the crop, and thereby greatly increasing the yield. Even in the Dunbar district, where on account of the very light rainfall and generally dry autumn weather the disease is not usually very prevalent, the systematic spraying of the potato crop is now the order of the day.

The Messrs Bowe, potato merchants, who grow potatoes extensively on the famous "red soils" at Dunbar and elsewhere in East Lothian, aver they would as soon think of growing potatoes without any artificial manure as they would think of neglecting to spray the crop at least twice, whether the season was of a kind to encourage the *Phytophthora* or not. Mr James Hope, Eastbarns, who for nineteen years held 1000 acres of the red soil at Dunbar at an annual rental of £5000, and whose farms are perfect object-lessons in high and successful farming, was at one time opposed to the system of spraying, as he thought the treading of the horse and machine among the rank "shaws" would do more harm than good; but in recent years he has adopted the system and finds it highly satisfactory, even although in that dry climate there is not usually much trouble with disease. The sulphate of copper solution has been very successful in combating the "yellow peril" (charlock) among the white crops, and it is equally successful in combating the "black peril" among the tuber crops.

With reference to what has been said above as to the influence of spraying in the way of prolonging the growing period of the crop and thereby increasing the yield, we may here quote the results of an experiment conducted by Mr Wallace, Terreglestown, Dumfries, the instructor in potato-growing for the Irish Department. The experiment was conducted on Mr Wallace's own farm, and was not at all on a small scale of plots, as an exact acre of the crop was purposely left unsprayed, all the rest of the field being sprayed twice, the produce of the unsprayed acre and of the adjoining acre being accurately weighed over the weighbridge. The crop was of the Langworthy variety, and the seed had all been sprouted in the usual way. The weight of the sprayed and unsprayed crops was as follows:—

	UNSPRAYED. Yield per imperial acre.			SPRAYED TWICE. Yield per imperial acre.		
	tons.	cwt	qrs.	tons.	cwt	qrs.
Ware . . .	8	4	0	9	16	0
Seed . . .	3	2	0	3	10	0
"Brock" . .	0	10	0	0	12	0
	11	16	0	13	18	0

Regarding the above table, Mr Wallace says: "The tonnage amazes me, as I did not imagine they would dress out so heavy. There was no disease in either lot."

Manuring the Crop.

In recent years much attention has been devoted by scientific experimenters to the most efficient and economical mixture of manures for the potato crop. Principal Wright of the West of Scotland Agricultural College has made a long and exhaustive series of experiments on this point, and in his last published

College Bulletin respecting his latest experiments on the subject he says:—

> "It has again been shown that the following combination of artificial manures, viz.—
>
> 4 cwt. superphosphate (30 per cent soluble),
> 1 cwt. sulphate of ammonia,
> 1½ cwt. sulphate of potash (95 per cent purity),
>
> applied at these rates per acre, along with 10 tons farmyard manure, is capable of producing as large and as good crops of potatoes as the character of the season and the soil will admit, and that the effects of omitting potash from the mixture of artificials causes a great diminution in the yield and value of the crop. . . . It has been found once more also that the following combination of artificials, viz.—
>
> 6 cwt. superphosphate (30 per cent soluble),
> 2 cwt. sulphate of ammonia,
> 1 cwt. nitrate of soda,
> 2 cwt. sulphate of potash (95 per cent purity),
>
> applied without any farmyard manure, is adequate for the production of good crops of potatoes. But it has also been further shown that on many farms the quantity of sulphate of potash included in the manure might be increased with advantage to 3 cwt. per acre."

The mixtures recommended by Principal Wright are practically the same as those recommended by the Irish Department of Agriculture, and are now regarded as the standard dressings for potato crops grown with or without farmyard manure.

In this connection it is worthy of note that Mr T. A. Scarlett, Edinburgh, who annually grows over 400 acres of potatoes for seeding purposes, uses a more complex manure, which he finds exceedingly satisfactory. The manures which he applies per acre are as follows: 20 tons of dung, preferably applied on the stubble in the autumn, and 5 cwt. of best ground lime, applied at the time the land is being cultivated in the spring; and at planting a mixture consisting of the following: 1 cwt. carbonate of magnesia, 1½ cwt. sulphate of ammonia, 2 cwt. sulphate of potash, 2 cwt. superphosphate, and 2 cwt. phosphatic guano. Mr Scarlett has unbounded confidence in this liberal and somewhat complex system of manuring, and he sets great store by the application of 5 cwt. ground lime and the 1 cwt. carbonate of magnesia—the latter substance, by the way, being an exceedingly effective ingredient in manuring for fruit-growing. Certain it is that his system of manuring has invariably given highly satisfactory results on all the numerous farms in the Lothians and elsewhere on which he has had potatoes grown for many years.

FAMOUS GALLOWAYS.

By the Very Rev. JOHN GILLESPIE, LL.D., Editor of the Galloway Herd Book.

IT goes without saying that the animals entitled to the above designation have been so numerous that to treat of them individually would occupy far more space than is at our disposal. Selections only can be given of the more famous, and in doing this many must unavoidably be omitted which, alike on account of their individual merit and the superiority of their offspring of several generations, might well have been included had space permitted.

The Castlewig Bull.

This bull, belonging to Mr Hathorn of Castlewig, was awarded first prize at the first Highland Show held at Dumfries in 1830. He was spoken of as being very good. He was bought by Mr Hope Johnstone of Annandale, who had an excellent herd, and he was also used in the herd of the father of the present writer, Mr James Gillespie, Annanbank, in which he left some very superior produce. Of his breeding nothing is known, but he was undoubtedly the means of effecting a marked improvement in the breed in Upper Annandale, where there were for many years a select number of fanciers of the Border blackskins.

Cumberland Willie (160) *or Borness.*

This bull is nowadays known to fame as being the sire of a number of famous bulls which were the fountain-head of the greater number of animals of the breed in subsequent times. To trace his offspring would be very much like constructing from the Herd Book a family tree with the branches growing from him as the main stem. His sire was Galloway Lad (320), used in the herd of Mr William Sproat, Borness, Kirkcudbright, the breeder of Cumberland Willie (160). His sons were—

(1) The Squire (18), the sire of several splendid cows which laid the foundation of the celebrated herd of Mr James Graham, Meikle Culloch, Dalbeattie. The Squire (18), after leaving Galloway, was used by Mr Walter Carruthers, Kirkhill, Moffat, and Mr John Graham of Shaw, Lockerbie, both owners of famous herds in their day. He was known in Upper Annandale as the blind bull.

(2) Black Jock of Riggfoot (66), own brother to The Squire (18), also at the head for a time of the black harem at Kirkhill,

being also the sire of some of the best cows belonging to Mr Gillespie, Annanbank. This was in "the 'Forties," and the Galloways—among the first exported to Canada, bred by Mr Carruthers, Mr Graham, and Mr Rogerson, Leithenhall—had the blood of these bulls in their veins.

(3) The Gaffer (162), used by Mr Jas. Grierson, Caigton, afterwards of Kirkland.

(4) Geordie of Riggfoot (234), the sire of the best of the stock of Messrs Shennan, Balig, including the famous Bob Burns (235). The price paid by Mr Shennan for him was £20, which was thought at the time (1848) to be very extravagant. Two of his daughters, both first-prize takers—viz., Rose of Dee (341), Seafield (347)—were bought by Mr Bowie, Mains of Kelly, for the purpose of being mated with Aberdeen-Angus bulls. Betsy (124) and Fair Maid (632), bred by Mr Gillespie, Annanbank, both prize-takers at Glasgow Highland Show, the latter sired by Black Jock of Riggfoot (234), were sold for a similar purpose. Greed (633 in Polled Herd Book), by Vulcan, Angus bull (93), out of Betsy (124), gained first prize at Elgin in 1855 as a two-year-old, and her daughter Lucy of Cloves (635 in Polled Herd Book) gained several first prizes. Maggie of Dalbeattie (767), bred by Jas. Graham, Meikle Culloch, a daughter of Fergy (19), gained several first prizes in the south of Scotland and north of England, including first at the Royal Show at Carlisle in 1855; was first as one of a pair in 1856 when the property of Mr M'Combie of Tillyfour, and also second at the Highland Show at Glasgow in 1857 when the property of Mr A. Pollok of Broom. This experiment of crossing Galloway cows with Angus bulls seemed to have succeeded fairly well at first, but ere long it was departed from.

(5) Mosstrooper (296), a renowned and impressive sire, besides being a conspicuous prize-taker, never having been beaten. When in his eleventh year he was taken by Mr Beattie, Newbie, Annan, to the Paris Exhibition, where he was champion of the breed, and notwithstanding his age attracted much attention, from the Emperor and Empress of the French to visitors from all countries; and

(6) Brother to Mosstrooper (67), the sire of Hannah (214), Semiramis (703), and other cows of great distinction bred by Mr James Graham.

All these bulls were bred by a Cumberland tenant-farmer, Mr George Graham, Riggfoot, who has been spoken of by The Druid in 'Field and Fern' as the "Black Booth of Cumberland and the Border Counties," from his having done for Galloways what Booth did for Shorthorns. Mr Grierson, Caigton, afterwards of Kirkland, used to say Cumberland Willie was the best sire of heifers he ever knew.

Bob Burns (235).

This bull by Geordie of Riggfoot (234), and bred by Messrs Shennan, Balig, had such a distinguished career in the show-ring that The Druid has termed him "The Nestor of Black Bulls." He was first at Castle-Douglas Bull Show as a yearling, where he was sold for £60; but he was returned by his purchaser on the ground of not being useful. This was most fortunate for the Balig herd, where he was chief stud bull for nine years. His dam was bred by Mr Cunningham, Dunrod Mill, whose herd, though small, in its day was very select. Bulls bred by him won three times out of four upwards of forty years ago at the sale of yearling bulls at Castle-Douglas, the trophy being regarded as "the blue ribbon" of the Galloway breed—an honour Bob Burns (235) carried off in 1856. His sons were widely used, and though many of his produce were not recorded in the Herd Book, which was started a score of years after his day, his blood was extensively diffused. He was used for a series of years by his breeder—in fact, so fond was Mr Shennan of his blood that some thought he used him too much, and exposed his herd to the danger of too much in-breeding. He afterwards was at Meikle Culloch for a few months, and thereafter was sold at £40 to be at the head of Mr Maxwell of Glenlee's herd in the Glenkens, which was of a very high class; and eventually he was used by Mr James Graham, who had to put him down from the result of an accident. He is described as being a grand Galloway of great substance, with stylish head and neck, broad back, deep ribs, and level quarters. Bob Burns (235) could walk like a Clydesdale horse. The most famous sons of Bob Burns were—

(1) Sir Walter (536), used with gratifying results by Mr Thomson, Blaiket, and Mr James Graham. He took a number of first prizes, which would have been more numerous had it not been his fate to have to meet in the show-ring his own sire, which vanquished him in common with other formidable competitors. The sire of the famous cow Jean of Drumlanrig (1637), dam of the illustrious Black Prince of Drumlanrig (546), was by Sir Walter (536). His daughters were proverbial for their exceptional excellence.

(2) Another distinguished son of Bob Burns was Sir James of Balig (537), bred by Messrs Shennan and used by Mr Thomson, Blaiket, in his old choice herd. The dam of Bob Burns (235) was Martha (101), by Galloway Jock (170), bred by Mr Halliday, Mullock, and the dam of Sir James (537) was Bell Black (733), also by Galloway Jock (170), so that Sir James was in-bred, for Bob Burns was mated with the half-sister of his dam, Sir James (537) being the produce. He was parted with after a single

year's service, as some of his calves showed white on their hind feet and white ringlets on their tails. He was sold privately to the Duke of Buccleuch for £50.

(3) Heir-at-Law (815), champion as a yearling at Castle-Douglas, produced some splendid cows in the herd of Mr William Routledge, Elrig, such as Harriet of Drumlanrig (1636), the dam of such celebrities as Duke of Drumlanrig (667), and Harriet 4th of Drumlanrig (2622).

Bob Burns (235) and some of his descendants were correctly credited with leaving some of their produce with white hind feet and white ringlets on their tails, and in fact this characteristic cropped out now and then many generations after his day. As already pointed out, his son Sir James (537) showed this in his immediate offspring, although he and Bob Burns (235) were "black and nothing but black."

Sir William (222).

Sired by Geordie of Riggfoot (234), this bull was bred by Mr Cunningham, Dunrod Mill, and was champion at Castle-Douglas Bull Show in 1858. He was a splendid bull, combining substance and quality in a special degree. He was specially prepared for the Highland Show at Dumfries in 1860, and was a great favourite for first place there; but the judges, after long deliberation, gave the premier ticket to Mosstrooper 3rd (279).

Mosstrooper 3rd (279).

This bull was first at the Highland and Agricultural Society's Show at Glasgow as a two-year-old, and was afterwards awarded the first place at the International Show at Battersea, London, in 1862. He achieved a far greater triumph at Dumfries after defeating Sir William (222), for he carried off, under the award of a mixed bench of judges, M. Dutrone's medal as being in the opinion of the judges "the best polled bull in the yard," thus beating all the Aberdeen-Angus exhibits in the show. He was a son of the illustrious Mosstrooper (296) which attracted so much attention at the Paris Exhibition.

Willie of Westburnflat (523).

Used extensively by Mr James Graham, Parcelstown, Longtown (formerly of Meikle Culloch), this bull had a brilliant career in the show-ring, having carried off £130 in prizes; but the presence of his blood in pedigrees was not universally regarded as adding to their value—at all events his breeding qualities were not equal to his proved high individual merits.

Robert Bruce (543).

This bull was bred by John Underwood, Crofts, and was used with most satisfactory results in the high-class herd of the Duke of Buccleuch at Drumlanrig. His dam was Curly, a cow whose reputation as a breeder of Galloways of the highest merit has never been exceeded in the history of the breed. She had a calf when seventeen years of age, and it is safe to say that had the Herd Book been in existence in Mr Underwood's day it would have been seen that his choice herd had exerted a great influence on the breed. Curly was bought by Mr Underwood in Cumberland, and when a heifer was pronounced the best young Galloway in existence. She was also the sire of Pretender (617). Robert Bruce (543) was champion at Castle-Douglas in 1865, and first two years later at Castle-Douglas, Dumfries Union, and the Highland Shows. His sire was Halliday, bred by Mr Maxwell of Glenlee.

Pretender (617).

This was a very famous bull both in the show-ring and at the stud. Calved in 1870, he was bred by John Underwood, Crofts (than whom in his day no one had a more choice herd of Galloways), his dam being Curly, noticed under Robert Bruce (543). Pretender's (617) sire was Dandy Jim, celebrated for the uniform superiority of his produce. The latter was bred by John Wallace, Langbarns, who had a specially good herd in his day, but his pedigree unfortunately cannot be traced. Dandy Jim was also the sire of The Marquis of Elrig (842), a very successful breeding bull. Pretender (617) had a very prominent showyard career. He was defeated at the show and sale of yearling bulls at Castle-Douglas by Cunningham (824), bred at Tarbreoch, but at the leading shows subsequently he turned the tables on the latter, and finished his career as the champion of his day. Cunningham (824), which also was a conspicuous prize-taker, was at the head of the Castlemilk herd for a time, but his name has dropped out of the pedigrees of the members of that premier herd, which seems to imply that his breeding qualities were not equal to his individual merits. Pretender (617) had a high reputation as a breeder. He was a bull of extraordinary substance: when killed he is said to have produced 119 stones of dressed beef and 20 stones of loose fat. Probably his most celebrated son was Sim of Whitram (562).

Sim of Whitram (562).

This bull was bred by Mr James Cunningham, Tarbreoch, and his showyard career was a very prominent one when he was owned by Mr James Graham, Parcelstown, who used him at the stud extensively, and with marked success. He was a thick, broad bull on short legs, and possessed exceptional quality. His dam was Lady Stanley (1670), whose sire, Hossack (1319), was bred by John Wallace, Langbarns, at or about the time Dandy Jim was used in his herd, so that it is probable that Sim of Whitram (562) had two crosses of that famous breeding bull in his veins.

The Stanlcy Family.

In this connection a general reference may be made to this well-known and highly-valued family. The distinction of founding it belongs to Mr Christopher Graham, formerly of Breckonhill, Longtown, afterwards of Harelawhill, Canonbie, and now of Skipmyre, Lochmaben. Few, if any, families have ranked among their members from generation to generation, and in the hands of different breeders, a greater number of animals of both sexes which have at the same time been conspicuous in the show-ring and have possessed a higher degree of symmetry and choice quality than the Stanleys. The winning members of this family are legion.

Liddesdale (1031).

This bull, bred by Mr James Graham, and a son of Sim of Whitram (562), was a conspicuous prize-taker; but he is worthy of special mention because of the influential part he played in leading "blue-greys" to be bred in Cumberland and the Border counties by mating Galloway bulls with Shorthorn cows of a good type. The use of Shorthorn bulls on Galloway cows had before his day been practised, with increasing approval and success; but the reverse method had been very little followed, except in a sort of casual way. Mr James Little, The Fauld, Longtown, bought Liddesdale (1031) and Lord Walter of Drumlanrig (1024), and mating them with good Shorthorn cows produced blue-greys of such a superior type that they were the admired of all admirers. He demonstrated the importance of using, in this method of crossing, sires of the best quality and symmetry, as well as of a good size. The advantage of this has been subsequently well recognised and widely followed. An animal of this class, bred by Mr Parkin-Moore of Whitehall, Cumberland, won the championship at Smithfield the other year. Mr James Little's name deserves to be handed down on account of his being the pioneer in this system of stock-breeding.

Harden (1151).

Harden (1151) (fig. 8) was probably Sim of Whitram's (562) most famous son, both in the show-ring and as a sire. He was bred by Mr James Graham, his dam being a member of his breeder's much-prized tribe of Galloways—Mary of Parcelstown (1420) by Willie of Westburnflat (523), tracing back to Hannah (214) by Brother to Mosstrooper (67). He was used for a time in the herd of his breeder, and afterwards for a series of years by Mr James Cunningham, Tarbreoch, in whose hands he had a triumphant showyard career at national and provincial shows, carrying off no fewer than fifteen first prizes against the best bulls of his day. At the request of the Highland and Agricultural Society, his portrait was painted by Mr Gourlay Steell, to be placed in their rooms as a specimen of a typical Galloway. Our representation of him is from that painting. Many of his produce were conspicuous in the showyard, but the opinions entertained of him as a reliable sire of first-class Galloways have varied. His son, Henry of Tarbreoch (4817), owned and used by Mr L. Pilkington, Cavens, who had a very superior herd for many years, carried off premier honours at several national and provincial shows, but it is doubtful if his success as a breeder was so marked as his showyard career was distinguished.

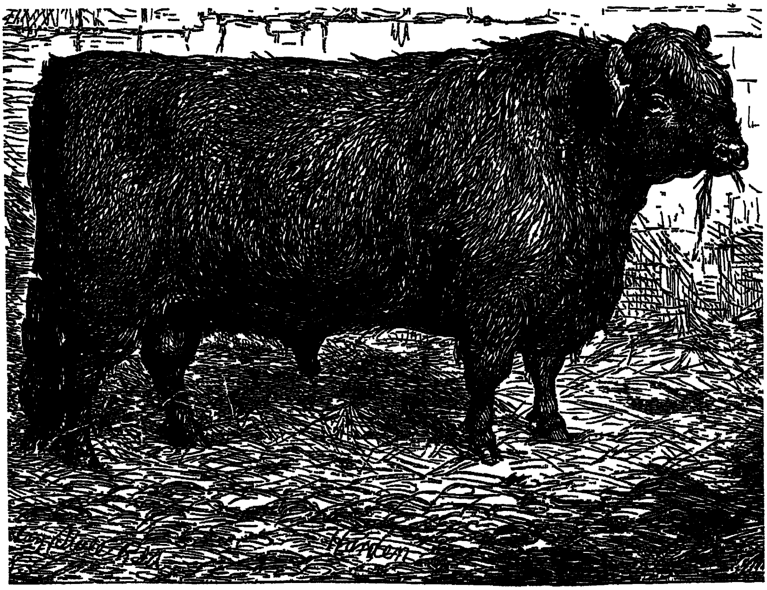

Fig 8.—Harden (1151).

Black Prince of Drumlanrig (546).

Very few bulls have had a higher reputation, or sires with his blood been more extensively used, than Black Prince of Drumlanrig (546). In fact, for a series of years the difficulty—and it was a real and serious one—with owners of the best herds was to procure bulls of good breeding and approved individual merit to mate with cows descended from him, so widely had his blood been diffused. He was champion of his year at the Castle-Douglas Bull Show in the hands of his breeder, Mr James Cunningham, where he was purchased by Mr James Cranston for the Duke of Buccleuch's herd at Drumlanrig. He was used there as extensively as practicable for many years with most gratifying results. Year after year at Castle-Douglas his sons were so well forward in the prize-list, and the repute of the superior breeding qualities of his produce was so high, that at very high prices there was a keen competition for them, few Galloway sires having proved so impressive as he and his sons did in their day. Their wide diffusion probably did more to improve the breed than any other sires since the days when the produce of Cumberland Willie (160) were available. His show-yard career, in keeping with his noble owner's practice, was almost entirely confined to national shows, and at these his career was a sort of triumphal procession. Unfortunately there is no available portrait of him — at least, no likeness worthy of him. He was only once photographed, for the writer, but it was not satisfactory. He was a bull of large frame, level outline, and excellent quality. He was instrumental in increasing the size of Galloways, which previously had become rather undersized from a tendency to unduly sacrifice a good large frame for quality. For a series of years breeders had acted as judges at the principal shows who gave a decided preference to animals of marked quality irrespective of their size, and the consequence was that by degrees not a few of the breed became smaller than is desirable, and Black Prince (546) did much to check and cure this evil.

The mating breeder of Black Prince (546) was Mr Gifford, Grange of Bladnoch, Wigtownshire, a county, we may remark, which is recognised as turning out larger-framed Galloways than any other district. His sire was bred by John Underwood, Crofts, about the time that he was using Dandy Jim, the sire of Pretender (617), so that it is possible that blood may have flowed in his veins. His dam was winner of a first prize at the time she was purchased by Mr Cunningham—her sire being Wallace of Blaiket (1113), a son of Sir Walter (536), one of the most celebrated sons of the illustrious Bob Burns (235).

Among Black Prince's (546) sons may be mentioned Beaconsfield (1344), champion of his year at Castle-Douglas, when he was purchased by Sir Robert Jardine, Bart. of Castlemilk, and subsequently first-prize winner at the Highland Show; Scottish Borderer (669), one of the best breeding bulls of modern times; and Statesman 2nd of Drumlanrig (1786), a celebrated prizetaker and sire, and others yet to be mentioned. Another son was Mosstrooper of Drumlanrig (1672) (fig. 9), which was often first at the two national and other exhibitions.

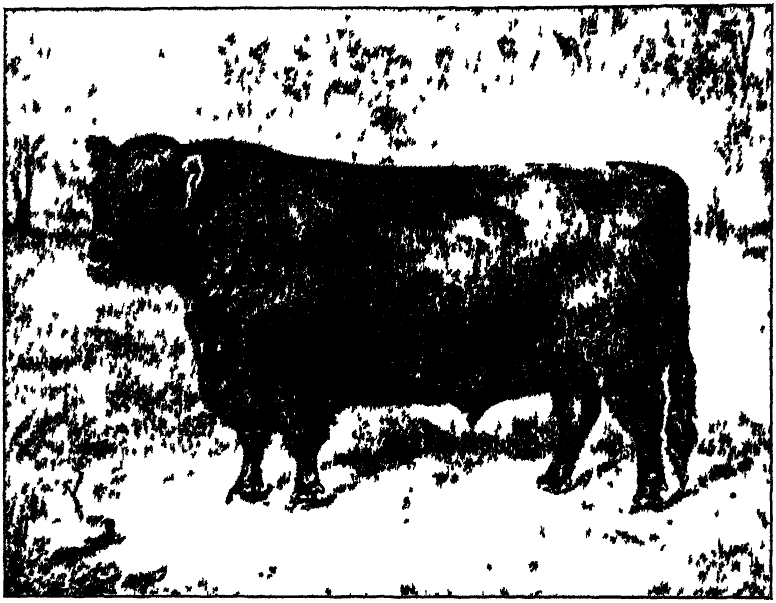

Fig 9 —Mosstrooper of Drumlanrig (1672).

Good Duke Walter (3268).

This bull was bred in pursuance of an experiment. Black Prince (546) was mated with his own granddaughter, Gay Countess (6600) by Duke 2nd (1022), and the above bull was the produce. He was bred by the Rev. John Gillespie, who had meanwhile purchased the cow. He was, as a yearling, third at the centenary show of the Highland and Agricultural Society, and second the following year at Aberdeen, where the winner on each occasion was Crusader (2858), to which was awarded the championship as best male Galloway at the former exhibition. He was exported to the United States, where he had a distinguished career both in the showyard and as a sire. It may be added, he possessed a vigorous constitution and had no drawback in this respect from his in-breeding.

Duke of Drumlanrig (667).

There was a great demand for the sons of this son of Black Prince (546), so that their wide diffusion had very much to do with the difficulty of getting outside blood to mate with the other descendants of Black Prince (546). The showyard career of Duke of Drumlanrig (667) was a distinguished one. Bred by the Duke of Buccleuch, he was bought by Messrs Shennan, Balig, and used in their old-established and superior herd. His dam was Harriet of Drumlanrig (1636), bred by Mr William Routledge, Elrig, Port-William, her sire being Heir-at-Law (815), an excellent breeding son of the illustrious Bob Burns (235), besides being champion of his year at Castle-Douglas Bull Show and sale. It will thus be seen that Duke of Drumlanrig (667) had two crosses of Bob Burns (235) in his pedigree. He had many sons which made their mark, but for breeding produce of uniformly high quality they must all yield to John Highlandman (1905).

John Highlandman (1905).

Of the Balig Black Beauty tribe on the dam's side, this bull was in the first instance at the head of the herd of Mr John Graham of Shaw, Lockerbie, and then went to preside over the recently established herd of Mr F. E. Villiers of Closeburn Hall, Thornhill. That gentleman built up in comparatively few years a choice selection of cows, but the most potent factor in bringing his Galloways to front rank was his use of John Highlandman (1905). In an exceptional degree his produce possessed genuine Galloway character, which they inherited from their sire. Their uniformly high quality and striking family character were outstanding features of them. With beautiful symmetry he combined much gaiety of style with a coat of lovely quality, and the brown tinge of hair which is so deservedly prized as symptomatic at once of hardiness and of a kindly, thriving disposition. His prize-winning produce are too numerous to be mentioned individually. However, we cannot pass over his daughter Vaudeville of Closeburn (8134), which, besides many other prizes, was first in the cow class and champion female at the Royal Show at Newcastle in 1887, and not a few of her descendants have been prominent in the hands of the Countess of Carlisle and Sir Robert Jardine, Bart. His son, Vale Royal of Closeburn (3804), besides other leading honours, was first in his class and won the champion cup as best male, and also reserve for the gold medal as best Galloway at the Royal Jubilee Show at Windsor in 1889. Vich Ian Vhor (4121), another son out of a Forest Queen cow, carried all before him at the two national shows, as well as at Castle-Douglas and Dumfries Union Shows.

The Queensberry Family.

This family, bred at Drumlanrig, are specially worthy of mention. The family of their dam Melantho (1643)—a prominent prize-taker—were for the most part sons; and though got by various sires, they proved specially good at the stud. The first of the family—viz., Queensberry (1027), by Blaiket (548)—left some capital produce in the herd of Mr Clark of Culmain. Queensberry 3rd (1673), a son of Black Prince of Drumlanrig (546), left some grand stock in the herd of Mr Robert Jefferson, Rothersyke, Cumberland, in whose hands he carried off many prominent prizes. One of his most celebrated daughters, Iolanthe (7009), out of Semiramis 10th (2971) by Sim of Whitram (562), was a very prominent prize-taker, especially in the north of England. Queensberry 4th (1785), also by the same sire, did much to improve the old-established and select herd of the Earl of Galloway.

Crusader (2858).

One of the many famous Galloways bred by Messrs Thomas Biggar & Sons, Chapelton, Dalbeattie, was the above bull. His sire was the famous son of Black Prince (546), Scottish Borderer (669), and he was out of a member of their old and well-known Clara family. Messrs Biggar won fourth prize with him at the Castle-Douglas Bull Show in 1884, where they also carried off first honours with his herd companion Chartist (2860). But having special faith in Crusader (2858), they withdrew him from the sale at Castle-Douglas, and had the satisfaction of winning first prize with him at the centenary Highland Show at Edinburgh four months later, where, however, Chartist (2860) was placed second. Crusader (2858), when led into the ring to compete against the older bulls for the male championship, came off with flying colours, for he vanquished them all. He was also first the following year at the Highland Show at Aberdeen. He left behind him many celebrated descendants, which it would take too much space to particularise. We may, however, mention Crucifix (4254), a bull of large frame and level outline, which was a prominent prize-taker in Wigtownshire, where he left excellent produce. He was used, when advanced in years, in the herd of Mr Stephens, Cholderton, Salisbury.

Royal Liberty (4140).

This bull had a noteworthy history. Bred by Messrs Shennan, Balig, he was sired by Liberty of Balig (1835), his dam being a member of the well-known Jenny of Balig family. Though only fourth at the Castle-Douglas Bull Show, he was taken out of the sale at the unprecedentedly high reserve price put on him by his breeders by Mr Cranston, manager to the Duke of Buccleuch, when he commenced farming on his own account at Tinwald House, near Dumfries. Mr Cranston, after using him for a time, sold him to Mr James Cunningham, Tarbreoch, in whose herd he produced many excellent animals of both sexes. Thereafter he was disposed of, at, it is understood, one of the highest figures ever paid for a Galloway, to the Countess of Carlisle, on whose stock he produced a most favourable impression. Other very distinguished sons of Liberty of Balig (1835) were Dictator of Balig (3845) and Liberator of Balig (3850), which were first and second respectively as yearlings at Castle-Douglas and the Highland Shows. However, Liberator (3850) turned the tables on Dictator (3845) at the Royal Show at Newcastle next year, for not only was the former first in his class, but he achieved the great distinction of being awarded the champion cup as best bull of any age, while the other was simply second in his class.

Braw Lad of Barskeoch (2041).

This was a bull with a grand frame, symmetrical as well as large, with plenty of substance, and yet excellent in quality. Bred by Mr John M'Turk, Barskeoch, Dalry, he was first at Castle-Douglas, where he was bought by Mr Andrew Montgomery; he was also first at the Royal Show at York and at Dumfries Union Show, which was a favourite meeting-place for the best Galloways, and at which the exhibitors were unusually anxious to win. At the centenary show of the Highland and Agricultural Society he was first in the two-year-old class. A few years later Mr Montgomery carried off premier honours at Castle-Douglas with his son, Gallant Lad of Nether Hall (4450), which was sold for a very high figure and taken to the south of England, which placed him out of the running for taking prizes subsequently. Braw Lad (2041) was by Osman Pasha (1282), which in some herds in the Glenkens proved himself an unusually good breeding bull. The latter's sire was a famous bull, Chieftain of Drumlanrig (752), which was champion at Castle-Douglas in 1875. The dam of Osman Pasha (1282) was Bridesmaid of Tarbreoch (1674), a very conspicuous prize-taker, and her produce also brought her great distinction.

Black Douglas of Castlemilk (5002).

Few Galloway bulls have been more successful at the stud than the above animal (fig. 10). Bred by Sir Robert Jardine, Bart., he was used for a long series of years on the members of the premier herd of Castlemilk as extensively as was practicable, the reason being that his produce almost invariably proved to be of exceptionally superior merit. In fact, it may be said that the Castlemilk Galloways are saturated with his blood, but not too much so. Though possessed of considerable individual merit, his showyard career has not been outstanding, partly because being calved at an unusual season—in August—he was not eligible in the younger classes, and also because he was not fed for exhibition. His sire was Bard of Castlemilk (4416), a son of The Macgregor (4063) by Queensberry 4th (1785) out of Tidy 8th (4313), a most famous cow, among the latter's honours being the first prize in the cow class at the Centenary Highland Show at Edinburgh in 1884. Bard's dam was Braw Lady (8005), which achieved great distinction in the hands, first, of Mr Andrew Montgomery, and afterwards of Sir Robert Jardine, Bart., including first honours as a yearling at the Highland Centenary Show, where her half-sister and herd companion Grand Lady (6629) was second. Both Tidy 8th

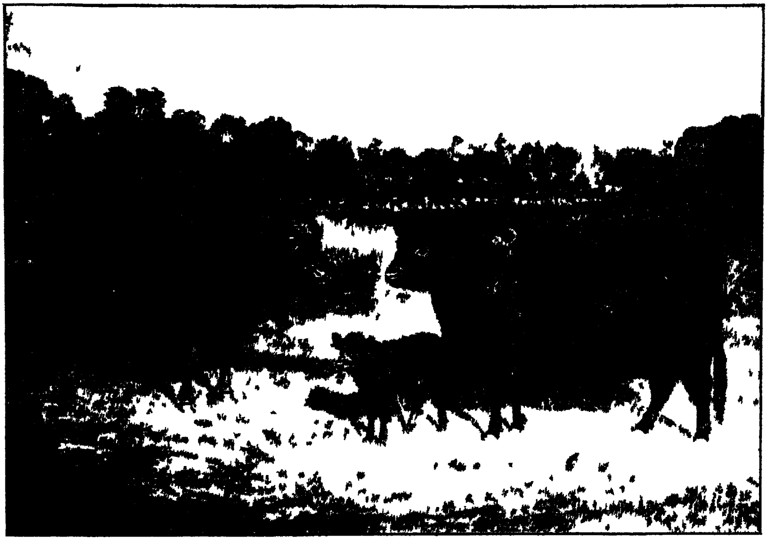

Fig 10.—Black Douglas of Castlemilk (5002).
Nancy Lee 2nd of Castlemilk (14,678)

(4313) and Braw Lady (8805) were then the property of Mr Montgomery, who was also first in the two-year-old heifer class, and gained the female championship with Netty of Culmain (4240).

The dam of Black Douglas (5002) was placed second to the gold medal cow Maggie of Tarbreoch (8613) at the Royal Jubilee Show at Windsor in 1889. This was Lady Isabella Douglas of Nether Hall (10,688), descended from one of the best tribes in the herd of the Earl of Galloway. She was successfully exhibited at Smithfield Fat Stock Show in the cow class in 1888, but her discriminating owner determined not to let her go to the shambles. Accordingly she was brought back to Castlemilk, and having been previously served by Bard (4416), her calf was the famous Black Douglas (5002), to which that herd and the breed generally owe so much,—one of his valuable characteristics being his own large size and that of his offspring. Many of his offspring of both sexes have been conspicuous against strong opposition. Out of many we may specify Druid (6159), which, after making a great name for himself in Great Britain, including the championship at the Highland Show at Edinburgh in 1899 on the occasion of the visit of H.R.H. the Prince of Wales (now H.M. the King), was exported to the United States, where he has since been well known to fame. Another son of Black Douglas (5002) was Nonpareil of Castlemilk (6163), which had an unvanquished career for a couple of years at every available show when the property of Mr Parkin-Moore of Whitehall, Cumberland.

Camp-Follower (5042).

Animals with this bull's blood have been in warm favour for breeding purposes, and they have left their mark influentially and very favourably on a large proportion of the best Galloway herds. He changed hands several times, and was mated with excellent cows, whose produce proved of unusually high merit. It is now a matter of difficulty, as it was with Black Prince of Drumlanrig (540), to find bulls of approved blood and high individual merit to mate with his offspring. He was extensively exhibited at national and provincial exhibitions for several years, and was invariably either at the top or in the very front rank. His sire was Chinaman (4154), bred by Mr James Cunningham, Tarbreoch, whose herd in its day produced a large number of animals of both sexes of the very highest merit. In fact, for years other good herds were greatly indebted to it for both bulls and cows. Chinaman (4154) was a son of the successful breeding bull Scottish Borderer (669), to which the herds of the Earl of Galloway and Mr James

Cunningham were greatly indebted for the best of their young Galloways. We may state that Chinaman (4154) was a full brother of what has long been known as the famous gold medal cow, Maggie of Tarbreoch (8613), on account of her having been awarded the gold medal as best Galloway at the Jubilee Show of the Royal Agricultural Society at Windsor in 1889. Camp-Follower (5042) was bred by Messrs Thomas Biggar & Sons, Chapelton, his dam being of their well-known Caprice family, tracing back to the herd of Mr George Greig, Milnmark. Our space does not permit us to particularise his illustrious descendants, seeing that to do so would necessitate transcribing many of the entries in not a few volumes of the Herd Book. Suffice it to say that his name and fame are "as familiar as household words." We may add that Chinaman (4154) was also the sire of Mary Graham (11,595). bred by Messrs Thomas Biggar & Sons, which by herself and her descendants has achieved no little fame.

The Maggie of Tarbreoch Family.

We have already referred to Maggie of Tarbreoch (8613) as own sister to Chinaman (4154) and as the winner of the gold medal and the championship as best Galloway at the historical Jubilee Show at Windsor in 1889. That and her record elsewhere in the show-ring were enough to make her famous, but her further record as a breeder has brought her quite as much distinction as her brilliant showyard career. She produced a numerous family in the hands of her skilful and successful breeder, Mr James Cunningham, and almost every one of them has made an enviable name for herself and for himself. In fact, it is safe to say that not since the days of Cumberland Willie (160) has there been such a distinguished family of Galloways. The bulls out of her have been named M'Dougall, and no other male family of one dam has quite equalled them alike in their showyard career and as sires. Fanciers of the Border blackskins are familiar with their achievements and prepotency. For example, M'Dougall 4th of Tarbreoch (6841), after a highly distinguished career in this country, was exported to the United States and was sold by public auction at Chicago for 2000 dollars—that is, about £416—and he has proved a good investment. Maggie of Tarbreoch's (8613) offspring, from Maggie 2nd (9727), calved in 1886, to Maggie 11th (15,460), have almost without exception come to the front—some of them to the very front rank. For example, Maggie 10th of Tarbreoch (14,747) by Camp-Follower (5042), after being very conspicuous for several years, wound up her showyard career by being first in the cow class in 1902 at the Royal Show at Carlisle, and at the Highland Show at Aberdeen, at the latter of which exhibitions she was awarded the President's Medal as being the best Galloway of either sex in the show-ring. She was then the property of Mr Robert Wilson, Kilquhanity, but Mr James Cunningham had the credit of breeding the whole family. Maggie (8613) had been mated with a variety of bulls, but her produce always proved to be of a high class.

The Madonna Family.

Members of this family have individually come into great prominence, and a considerable number of male representatives of it have made an influential and favourable impression on the breed. The first female of the name Madonna (6524) was fancied by the Rev. John Gillespie, who purchased her from her breeder, Mr Shennan, Barmoffity. She was full of Balig blood. She was not exhibited except when a heifer, being first as a yearling at Dalbeattie, and at the Royal Show at York as a two-year-old. She passed into the hands of Mr Cunningham, Tabreoch, who bred a considerable number of remarkably good animals of both sexes from her and her descendants in the female line, including Madonna of Tarbreoch (10,427) by Harden (1151), Madonna 2nd of Tarbreoch (11,056) by Statesman 3rd of Drumlanrig (2624), and Madonna 3rd of Tarbreoch (11,531) by Scottish Borderer (669), which brought much *éclat* to the family by their prominence in the show-ring. Two sons of Madonna of Tarbreoch (10,427) by Harden (1151) made names for themselves both in public competition and as sires. These were Scottish Knight of Tarbreoch (5299) by Scottish Borderer (669), and Scottish Knight of Durhamhill (5924) by Camp-Follower (5042), both of which, we need not point out, contained a combination of the very best blood. From Madonna 2nd of Tarbreoch (11,056) by Statesman 3rd of Drumlanrig (2624), Mr James Cunningham bred two bulls of exceptional excellence and impressiveness. These were The Pathfinder 2nd (5838) by Cedric 2nd (5060), and The Pathfinder 3rd (5991) by Camp-Follower (5042). The former took many prizes, but the latter eclipsed him in every respect. As a sire, it is true, Pathfinder 3rd (5991) had specially favourable advantages, for he was used successively in the very superior herds of Mr Graham, Harelawhill, and of Sir Robert Jardine of Castlemilk, in which he was mated with cows of outstanding quality and merit. One of his celebrated sons was Scottish Standard (6488), out of Gentle Rose 2nd (13,029) by Camp-Follower (5042). Scottish Standard (6488)—which, it will be seen, was in-bred, having two crosses of Camp-Follower (5042) in his veins—after a brilliant career on both sides of the Border, was exported to the United States, where no Galloway bull has made for himself a higher reputation. He earned a great name in the show-ring, and, if possible, even greater fame by the uniform excellence and show-yard achievements of his numerous produce. He was bred by Mr Graham, Harelawhill, and owned and used in Scotland by Mr John Cunningham, Tarbreoch, who has successfully followed in the footsteps of his father in maintaining the high reputation of the Tarbreoch herd.

Another noted son of The Pathfinder 3rd (5991) was Excelsior (7702) (fig. 11), bred by Sir Robert Jardine, Bart. of Castlemilk, his dam being Lady Soncy 3rd (15,024) by Nestor 2nd of Castlemilk (5467). In the hands of Messrs Thomas Biggar & Sons, Chapelton, he carried all before him against the best bulls of his day, and in a remarkable degree he imparted to his produce the exceptional quality which was one of his own outstanding characteristics.

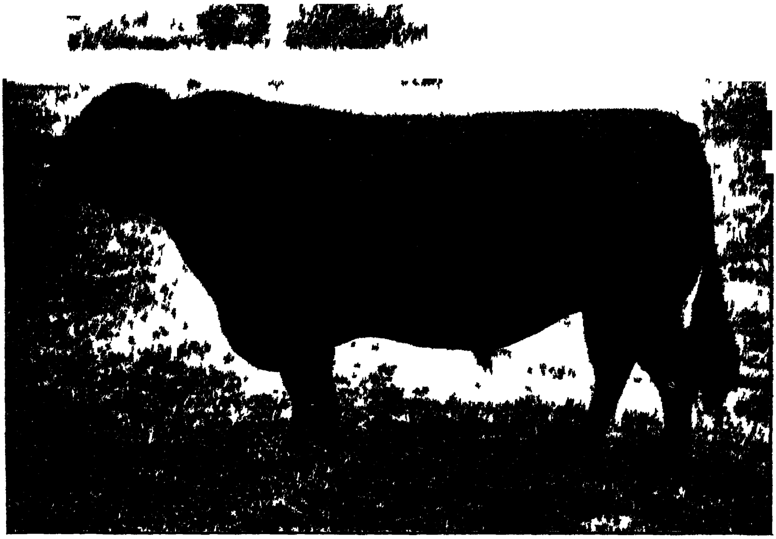

Fig 11 —EXCELSIOR (7702).

Another of the many distinguished sons of The Pathfinder 3rd (5991) was Jubilee Gift (6856), out of Harelawhill Lizzie (13,031) by Camp-Follower (5042). After winning at Castle-Douglas as a yearling, this bull—also in-bred—had great success in the show-ring in the hands of Mr Robert Jefferson of Rothersyke, Cumberland, who used him with gratifying results in his choice, carefully-built-up herd.

The daughters of The Pathfinder 3rd (5991), which made great names for themselves, were unusually numerous—too much so to be mentioned individually.

A bull, Bondsman (7306), by Cedric of Naworth (6634) out of Madonna 4th of Tarbreoch (11,988) by Scottish Borderer (669), was champion of his year at Castle-Douglas; he afterwards was conspicuous in showyards in Ireland, and in 1903 was first in his class and champion at the Highland Show at Dumfries.

The Tidy Family.

The Tidy family has produced a considerable number of famous Galloways. The foundation cow of the family was in-bred. This was Tidy (2647), calved in 1864, and sired by Geordie 2nd (528). The latter was by Bob Burns (235), and the dam of Tidy (2647) was Flora Macdonald (360), got by Geordie of Riggfoot (234), which was sire of Bob Burns (235). This was an instance of Mr Shennan's practice at this time of in-breeding, from his fondness for the blood of Bob Burns (235); for from the above it will be seen that Geordie 2nd (528) was mated with his own aunt, the half-sister of his sire, Bob Burns (235). Still further, Tidy 2nd (2654) was by Mick (1042), a son of Bob Burns 3rd (1091), the latter being by Bob Burns 2nd (1090), also a son of Bob Burns (235). The most celebrated member of the family was Tidy 8th (4313) (fig. 12), which in the hands of Mr Andrew Montgomery was awarded first honours at the centenary show of the Highland Society in 1884, and also at the same national show in 1885 and in 1886. In 1885 Mr Andrew Montgomery was first, second, and third in the cow class, his Matchless Countess (7917) and Netty of Culmain (4240) being second and third respectively. In the two-year-old heifer class he was first and second with Braw Lady (8805) and Tidy Lass (7997). With almost the same animals, the following year at Dumfries, Sir Robert Jardine, Bart., won the four leading prizes in the aged cow class, and first, second, and fourth in the three-year-old cow class. He was also first in the aged bull class with Mosstrooper of Drumlanrig (1672), and first and second in the two-year-old bull class with Roger of Oakbank (3390)—afterwards exported to the United States—and with Paymaster (3399) respectively. At this show Sir Robert gained the three family prizes—first, second, and third—with three groups consisting of three families, each composed of a cow and three of her descendants. Tidy 4th (3447) was awarded the much-coveted prize for the best cow with three of her descendants, these being Tidy 8th (4313), Independence (1695), and Liberty of Balig (1835), alluded to elsewhere. Independence (1695) was a grand bull, being first everywhere in 1882, and carrying off the special prize as best bull of any age at Dumfries Union in 1883. The second group consisted of Jenny Duke (3842) and three of her descendants, and the third was Susan of Castlemilk (10,269) and her offspring. It was a triumphant day for the Castlemilk herd, seeing to it was awarded six first prizes out of eight classes, besides four seconds and several subsidiary tickets. Tidy 8th (4313) had her first calf when a two-year-old, but this did not check her growth and development. She was a cow of comparatively short pedigree, her sire being Duke of Edinburgh (1417) and her dam was by Duke of Drumlanrig (667). Tidy 8th (4313), as may be inferred from her portrait, was a magnificent cow, full of quality, with immense substance.

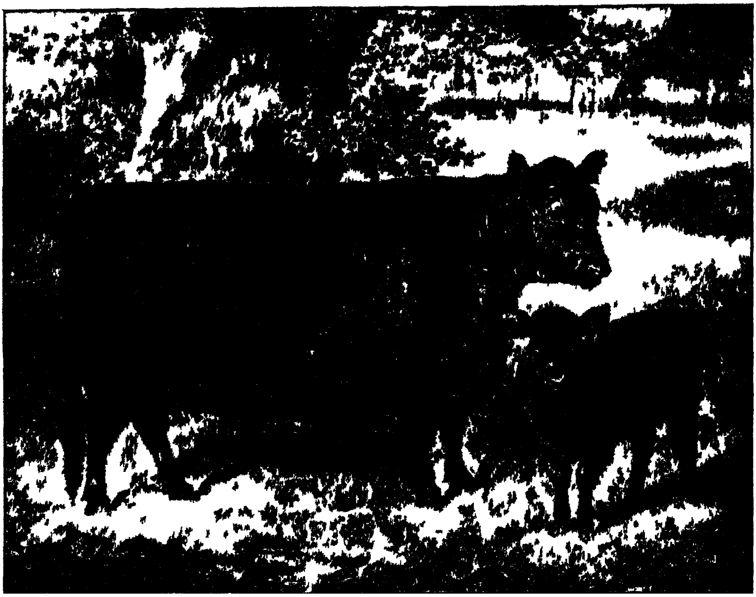

Fig 12.—Tidy 8th (4313).

The Tarbreoch Lizzie Family.

Like the Stanley family, the Lizzie family was founded by Mr Christopher Graham, formerly of Harelawhill, and now of Skipmyre, and an unusually true-breeding superior one it has been. A branch of it became very prominent in the hands of Mr James Cunningham. For example, Tarbreoch Lizzie 3rd (9680) by the famous bull Harden (1151) was a most distinguished prize-taker—including first at the Highland Show on two occasions. Another member of the Lizzie family is Luxury 3rd of Tarbreoch (13,925), which has made a great name for herself in the show-ring, principally in the hands of Major Wedderburn Maxwell of Glenlair. She was a daughter of the illustrious bull Camp-Follower (5042), to which we have had occasion so frequently to refer. Her dam was by Bob of Hensol (1860), which was sold by the writer for exportation to Illinois, U.S.A., where he earned an unusually high reputation as a sire both in pure-bred herds and for crossing with highly-graded Shorthorn cows.

The Cedric of Tarbreoch family of bulls, which came very prominently to the front against heavy competition, were members of the Lizzie family on the dam's side. For example, Cedric of Tarbreoch (5060) by Scottish Borderer (669) carried all before him as a yearling, including the championship of his year at the Castle-Douglas Bull Show and sale, and was subsequently very prominent in the principal showyard competitions. Cedric 2nd of Tarbreoch (5483), by Lucky Times (3058) out of Tarbreoch Lizzie 3rd (9680), was also first at Castle-Douglas as a yearling, and in the following year had an unvanquished career at the two national exhibitions as well as at other leading shows. Cedric 4th of Tarbreoch (6466), by the famous Camp-Follower (5042) out of above Tarbreoch Lizzie 3rd (9680), was second as a yearling at Castle-Douglas; afterwards won first prize in the aged class, and special as best bull at the Highland Show at Stirling. It will thus be seen that very few cows have produced a succession of more distinguished produce than Tarbreoch Lizzie 3rd (9680), and other members of that most reliable breeding family have done equally well.

The Scottish Queen (11,524) family was an offshoot from the Lizzie family. In fact, that cow was by the same bull—Harden (1151)—as was Tarbreoch Lizzie 3rd (9680), their dams being half-sisters on the female side. Scottish Queen (11,524) was first as a two-year-old heifer at the Highland Show, and when only three years of age she carried off in the cow class first honours at the Highland Show at Inverness in 1892. Her daughter, Scottish Queen 2nd of Castlemilk (14,284) by Camp-Follower (5042), took a prominent position, and another daughter, May Queen of Tarbreoch (13,120) by Royal Liberty (4140), also kept up the high reputation of the family.

The Dora Family.

In modern times few Galloways of either sex have met with greater success in the show-ring than Dora of Durhamhill (13,550) (fig. 13), bred by Mr James Cunningham, Tarbreoch, and owned by his son, Mr John Cunningham. Her record at successive Highland Shows speaks volumes as to her achievements not only at these national contests but also at leading provincial exhibitions. She was first as a yearling in 1894; also in 1895, as a two-year-old, with Galloway Cattle Society's champion prize as best female, crowning her achievements on that occasion by being awarded the President's Medal as best Galloway of either sex. In 1896 she was first as a cow, though only three years of age, and again carried off the coveted President's Medal as best Galloway. She was disqualified in 1897 to compete in the cow class, having already won first honours therein; but she was shown as extra stock to qualify her to have a chance of the President's Medal, which she again succeeded in winning. She thus accomplished the unprecedented feat of carrying off the President's Medal for best of the breed in three years out of four, and on the fourth occasion she was first in the yearling class. No representative of the Border blackskins was ever better entitled to be included among "famous Galloways." Her sire was the illustrious show and breeding bull Camp-Follower (5042), and her dam was Dora 4th of Tarbreoch (11,996) by the equally celebrated bull Harden (1151), tracing back on the dam's side to Louisa of

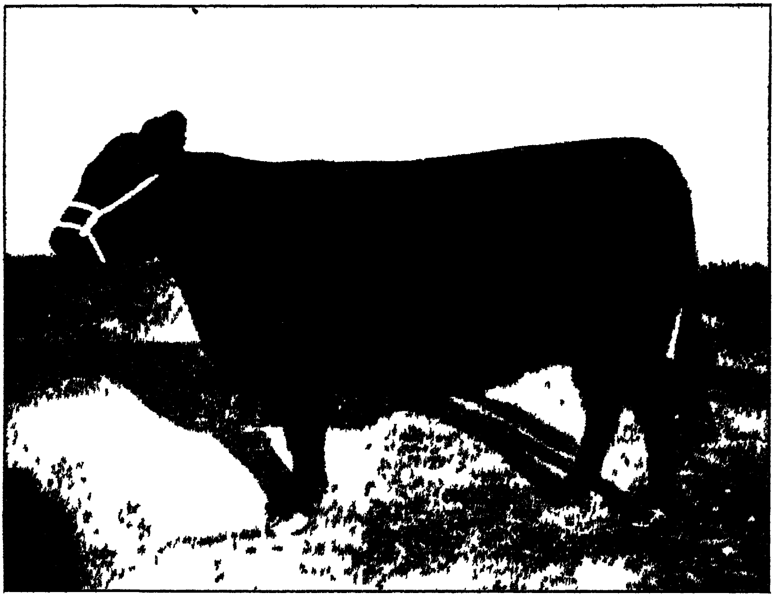

Fig. 13.—Dora of Durhamhill (13,550).

Drumlanrig (1642), a famous cow whose dam was bred in the parish of Mouswald about fifty years ago. Doris of Kilquhanity (16,912), a daughter of Dora's by Great Scot (6489), was champion at Castle-Douglas and Newton-Stewart, and also second in the cow class at the Royal Show in 1905. A son of Dora's (13,550), which made a name for himself both in the show-ring and at the stud, was Lord William of Durhamhill (7108), whose sire was Scottish Standard (6488), alluded to in this paper as having made the highest reputation for himself both in this country and in the United States of America.

A full sister of Dora's (13,550)—viz., Louisa of Durhamhill (14,355)—made a distinguished name for herself, being in the front rink in the national and other leading shows for a couple of years. Another full sister, Louisa 2nd of Durhamhill (14,925), was even more celebrated, inasmuch as, in addition to many high honours in the preceding year, she carried all before her at the two national and other most important exhibitions when a two-year-old in 1898, including the President's Medal as best Galloway at the Highland Show at Kelso.

The Alice of Castlemilk Family.

Several members of this family have been famous. They were founded on one of the strains of the Culmain herd belonging to Mr Maxwell Clark, from which some of the most famous winners have been drawn, including Netty of Culmain (4240), the champion female at the Highland Centenary Show at Edinburgh in 1884. The cow Alice of Castlemilk (14,282), by Lowlander 2nd of Tarbreoch (5992), a first-prize Highland Show bull, has produced two illustrious daughters, both sired by the grand breeding bull The Pathfinder 3rd (5991). These are Alice 2nd of Castlemilk (16,352) (fig. 14), and Alice 3rd of Castlemilk (16,867), calved in 1900 and 1901 respectively. These full sisters were not only warmly admired for their outstanding individual merits, but they have all along been as like each other as peas, showing the true breeding qualities of the family. They are remarkable for their beautiful symmetry, superb quality, and wealth of flesh. Alice 3rd has had the more brilliant showyard career. She was second at the Royal Show in 1902, first at the Royal Show in 1903, and in 1904 she was taken to only three shows—viz., the Highland, Dumfries, and Lockerbie—and besides being easily first in her class, she was awarded the Champion Cup at each. "She came, she was seen, she conquered," and that everywhere.

Alice 2nd (16,352) was destined for three years to stand second at the two national shows to the best of the breed, including her own younger sister Alice 3rd (16,867) (fig. 15) at the Highland

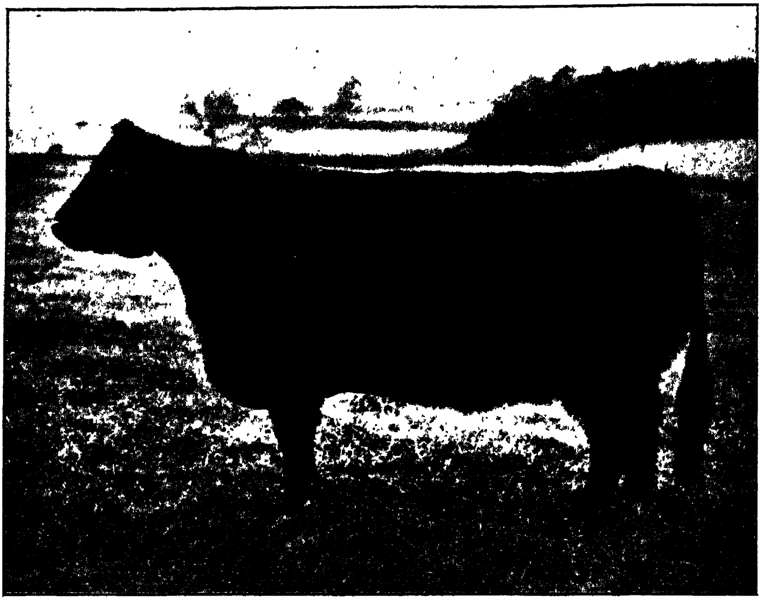

Fig. 14.—Alice 2nd of Castlemilk (16,352).

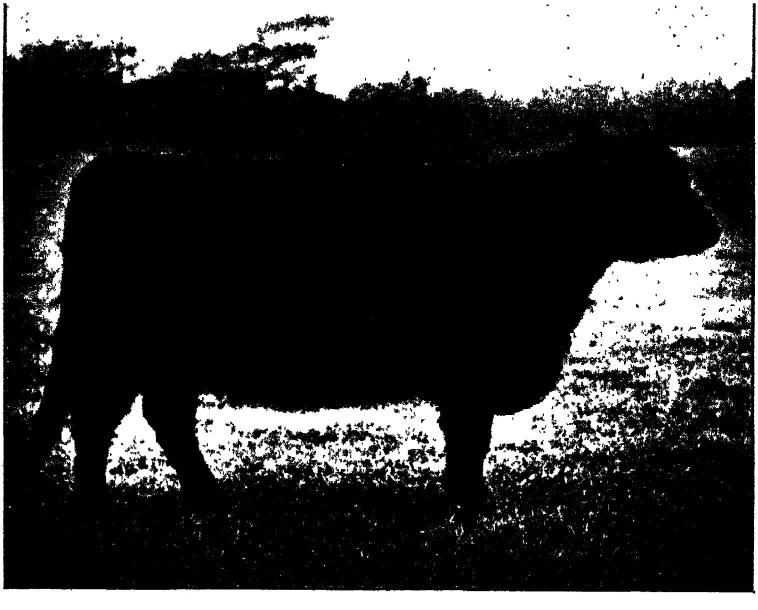

Fig. 15.—Alice 3rd of Castlemilk (16,867).

Show in 1904, when the latter was awarded the President's Medal as best Galloway in the yard; but at length at the Royal Show in 1905 she carried off first honours in the cow class, and also the Galloway Cattle Society's champion prize for the best Galloway of either sex in the showyard. It was indeed a red-letter day in the history of that choice family of the Castlemilk herd when in the cow class at the Highland Show at Perth in 1904 Alice 3rd (16,867) was first (besides winning the President's Medal), Alice 2nd (16,352) was second, and their mother, Alice of Castlemilk (14,282), notwithstanding her advanced age of nine and a half years, was highly commended. It may be added that a daughter of Alice 2nd (16,352)—viz., Lady Alice of Castlemilk (17,903)—was first as a two-year-old at the Highland Show in 1905.

The Nancy Family.

Sir Robert Jardine, Bart., had a great partiality for the Nancy family. Nancy of Castlemilk (3037), the foundation cow, was one of the earliest members of his herd, from a good old sort bred by Messrs Halliday, Whitriggs, Lockerbie. She was bought for £20, her sire being Commander (1263), bred by Mr Maxwell Clark of Culmain, his sire being Pretender (617), and his dam a famous breeding cow, Miss Crocket, whose produce brought fame to the Culmain herd. The number of the Nancy of Castlemilk tribe which brought high distinction to the Castlemilk herd is legion. She had no fewer than fourteen calves, all heifers except the two last. She was rather undersized, but her produce had plenty of substance. Our limits permit us to specify only two of her descendants. These were Nancy Lee 2nd of Castlemilk (14,678) (fig. 10), and Nancy Lee 3rd (15,019) (fig. 16), calved in 1896 and 1897 respectively, and both sired by the famous breeding bull Black Douglas of Castlemilk (5002). We confine our record of their achievements to one incident in the history of each. Nancy Lee 2nd (14,678) was first in the cow class, and was awarded the Galloway Cattle Society's prize as best female, also the President's (H.R.H. the Prince of Wales) Gold Medal as best Galloway of either sex at the Highland Show at Edinburgh in 1899, on which occasion also, it may be mentioned, Sir Robert Jardine carried off the Galloway Cattle Society's Medal for best bull of any age with Druid of Castlemilk (6159). The following year, at the Stirling Highland Show, Nancy Lee 3rd of Castlemilk (15,019) (fig. 16) was first in the cow class when only three years of age, and was also awarded the President's Medal as best Galloway in the showyard. The record of the Castlemilk Nancy Lee and Alice families is thus a unique one. Nancy Lee 3rd and her daughters are represented in figs. 17 and 18.

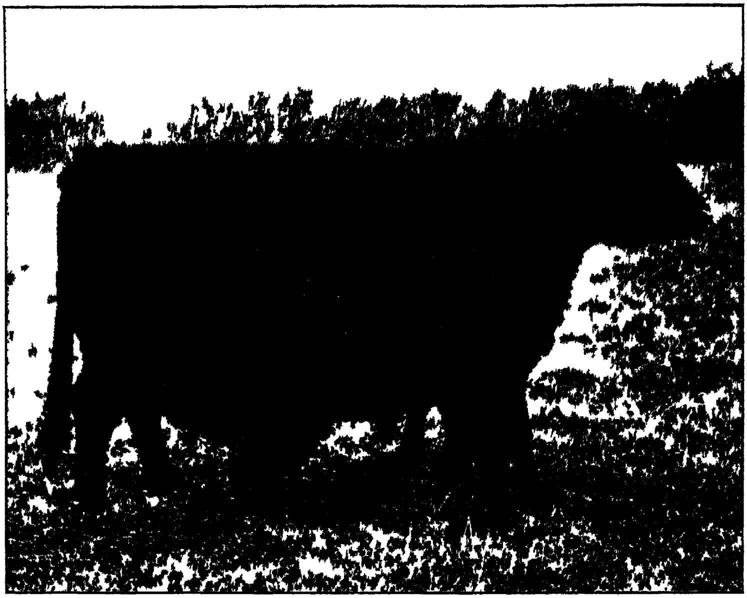

Fig 16 —Nancy Lee 3rd of Castlemilk (15 019)

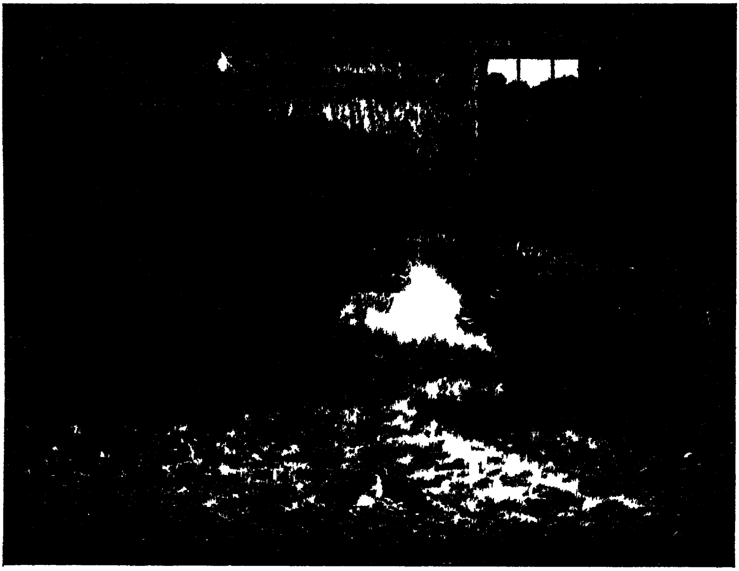

Fig 17 —Nancy Lee 3rd of Castlemilk (15,019)
Lady Lee of Castlemilk (15,910)

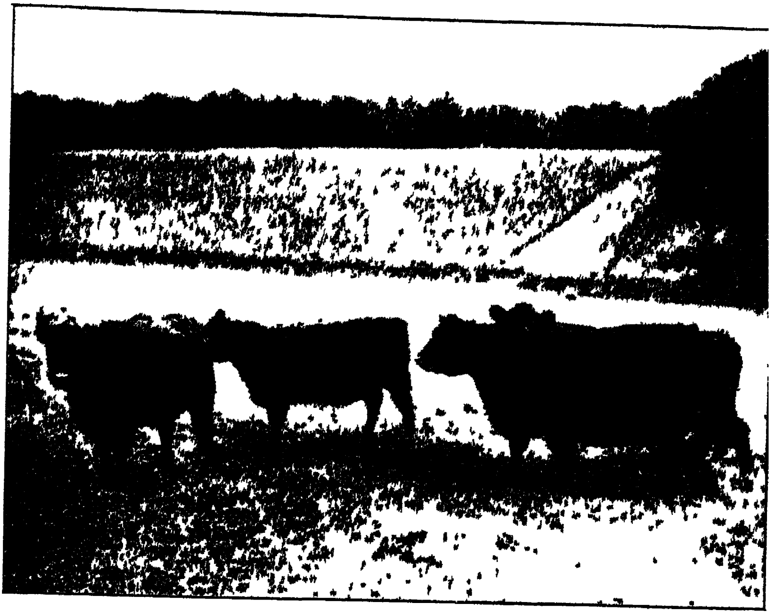

Fig. 18.—Nancy Lee 3rd (15,019) and her Daughters.

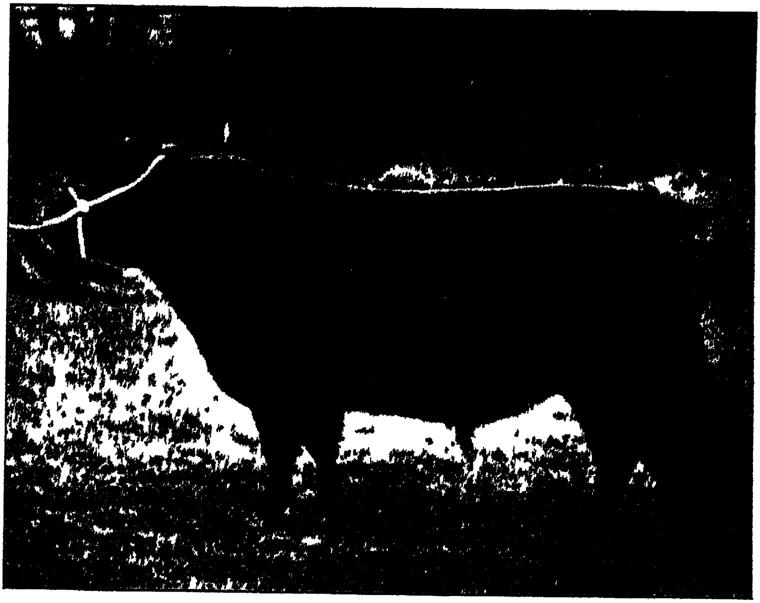

Fig. 19.—Camp-Follower of Stepford (7476).

Camp-Follower of Stepford (7476).

This bull (fig. 19) was shown at every show of any consequence in Great Britain before he was exported to America by Mr Swigart, and he never met with the slightest check in his triumphant career, extending over four years. He was shown against the best bulls, and not only was he uniformly first against the bulls of his age, but he won every special prize for which he competed. He was bred by Mr David Brown, Stepford, in whose skilful hands he was exhibited with the results we have stated. His sire was the bull Black Prince of Durhamhill (6846), a son of Camp-Follower (5042) out of Dora 4th of Tarbreoch (11,996). His sire was thus a full brother of the illustrious champion cow Dora of Durhamhill (13,550). His dam was Edie of Durhamhill (14,926) by Contender 4th of Tarbreoch (5994). On the dam's side he is a member of the Drumhumphry herd (Mr Scott's), whose Bell family has brought it much credit. Black Prince of Durhamhill (6846), among other honours, won first prize at the Royal Show.

Worthy 3rd (7762).

This bull, as far as we know, was only shown at Castle-Douglas Open Show when two years of age, and he was placed first in a good class. His sire was Grace Royal (7123), a son of the famous Pathfinder 3rd (5991) out of Soncie Lady 3rd of Harelawhill (13,533), a cow which was conspicuous at shows on both sides of the Border. The dam of Worthy 3rd (7762) was bred by Mr Carruthers, Kirkhill of Wamphray, from which some of the Galloways exported to Canada about the year 1850, as already mentioned, were taken. Worthy 3rd left some good stock behind him, including Netty 32nd (17,996), which carried off first prize in the two-year-old class at the Royal English Show in 1905. Since Worthy 3rd (7762) reached the United States he has made a great name for himself in the show-ring, having defeated there not a few of the best bulls imported from this country. Indeed, some authorities regard him as one of the best, if not actually the best, Galloway bull taken to North America from Great Britain.

N.B.—The portraits of Galloway cattle in this paper are for the most part reproduced by kind permission from paintings by Mr D. Gourlay Steell.

ABERDEENSHIRE HORNED CATTLE.

By JAMES R. BARCLAY, 'Banffshire Journal' Office, Banff.

PERHAPS no county in Scotland presents a more interesting history in regard to its breeds of cattle than does the county of Aberdeen. To-day, with its great herds of Shorthorn cattle, it stands pre-eminent in the world of Shorthorn breeding, and it can never be forgotten that in one of its little corners there was preserved in its purity the breed of Aberdeen-Angus cattle, which, with its steady evolution, was to add yet more lustre to the cattle-breeding record of the county. But long before the era of the great "intruder," and long before the native breed of Buchan had assumed its distinguishing name, the county of Aberdeen was famed far and wide as the home of a valuable race of cattle, known as the Aberdeenshire black Horned breed. These cattle have long since passed out of existence,—their very characteristics are remembered by only a few of the older amongst our farmers,—and it may not be uninteresting, therefore, to gather together from the various obscure sources, where passing notice of the cattle is made, some notes regarding the race of cattle which first gave to Aberdeenshire a leading place among the cattle-breeding counties of the United Kingdom.

In tracing the decline and extinction of this breed of cattle, Aberdeenshire's greatest industry is touched at many interesting points, and there are brought out some of the changes which have overtaken this branch of the county's agriculture since the closing years of the eighteenth century. At that time the Aberdeenshire Horned breed held the foremost place among the cattle of the North, but towards the middle of the nineteenth century changed conditions brought about its complete extinction. The breed was not allowed to die out "unwept" or "unhonoured," but, so far as we have been able to learn, it has been allowed to disappear "unsung," for early writings on the agriculture of Aberdeenshire contain little that is definite in regard to the breed.

The difficulty of tracing something of the history of Aberdeenshire Horned cattle is increased by the fact that, prior to the advent of the Shorthorn era, the whole of the cattle of the county were described in the comprehensive term of "black cattle," and thus it is not in every case clear to decide when the Horned cattle are referred to, or when the "hummel" or Polled cattle of Buchan are referred to. By the close of the eighteenth century horses had, generally speaking, taken the place of the oxen at the plough, and greater attention was beginning to be paid to the rearing of cattle. Nearly a hundred years ago it could be said of Aberdeenshire that it raised a greater number and value of black cattle than perhaps any other county in Scotland.

It must be recalled that, before the union of the two kingdoms of Scotland and England, the English Parliament prohibited the introduction of Scotch cattle into England. At that time few of the Northern counties took part in the droving of cattle to the South, restricting their attention more to sheep-farming than to the rearing of cattle. The union of the two kingdoms in 1707 put an end to most of the commercial disputes between the two countries, but, on the other hand, the limitation of the Scotch wool to the markets of Great Britain, which followed upon the union, produced a great fall of its price, and farmers in the North accordingly began to turn their attention to the rearing of cattle.

The era of tilling the soil more extensively led to the demand for work oxen by the farmers in Aberdeenshire, and thus there began the introduction of the Fife or Falkland breed. This breed was found to be the best for the raising of large strong bullocks suitable for the plough and other heavy work of the farm. The native cattle of Aberdeenshire were originally very small, but the crossing with these southern breeds, and the introduction of turnips and the system of sowing grass, brought about a great change. By the feeding with turnips alone it was found that an animal one year old was equal in size—and size was then the all-important point—to what the same animal would have been at two years old on its former dry, stinted food. So diminutive in point of size indeed were the native breeds of the county, that only the poorer farmers used them for the plough.

It has been stated that this Falkland breed, to the introduction of which a great deal of the early improvement in the cattle-breeding of Aberdeenshire was due, had originally been raised from some English cows which Henry VII. (1485-1509) sent in a present to his eldest daughter Margaret, who had married James IV. of Scotland (1502). However this may be, this at least is certain, that by a grading up of the native cattle of the county with representatives of the Falkland breed, there was raised up the race of cattle known as the Aberdeenshire Horned breed, which became widely known, and laid the early foundation of the reputation of the north-eastern counties of Scotland as a cattle-raising district.

The introduction of the Falkland cattle was thus the first step taken by the Aberdeenshire farmers towards that "early maturity" which is now the goal of all breeders and feeders.

Then, however, it was not a case of bringing the cattle early to the block as it is now, but of getting them up to a size when they could take their places in the yoke. Working oxen were often kept till they were eleven or twelve years old—and cases are recorded where they were seventeen years old—and then sold to cattle-dealers to be fed off!

About the middle of the eighteenth century, however, the farmers of Aberdeenshire began to reap some of the benefits arising from the carrying of cattle to the markets of England. In the early experiments to fix upon the most suitable class of stock to meet the requirements of that day, various breeds were used, and Lancashire crosses, Holderness cattle, and others, were tried; but such experiments became abortive, a mixture of the Falkland and native breeds being found to produce the requisite points better than any of the English breeds, or of the crosses from them. It was thus by no haphazard stroke or luck that the Aberdeenshire Horned breed came to be established, but only after careful experiments to find out the best lines to go upon; and this fact supplies yet more testimony to the valuable qualities which the Horned cattle of the county of Aberdeen must have possessed. Many of the breeds then introduced from England by some of the landed proprietors were discarded for various reasons, and attention was turned by the raising of well-shaped bulls at home, or by fresh importations of the Falkland breed, to the fixing of a definite type, and the creating of a distinctive race. By these means there was evolved what proved the largest breed of cattle in Aberdeenshire, though in view of present-day experiences no very startling results were obtained, when it is recalled that animals of the breed when five years old weighed alive from 5 to 7 cwt., and at seven years old from 7 to 8 cwt., while the weight of what is described as a "full-fed" bullock is given as from 10 to 12 cwt.

Droving, however, in these days was largely confined to English dealers, whose presence in Aberdeenshire is noted as early at least as 1766, when in the months of June and July they came North and acquired cattle for the English markets. Prices were then reasonably good, and the appearance of this new outlet for their newly-adopted industry led to a great impetus being given to cattle-breeding in Aberdeenshire. The farmers there began to depend more and more on their own resources, rather than to rely on the introduction of more fresh blood, for the perfecting of the type of cattle which they found best adapted for the English markets. Thus it came about that the grandsons of the Lothian farmers who supplied Aberdeenshire with working oxen prior to the middle of the eighteenth century, and the sons of the Fifeshire farmers who succeeded them in the rearing of cattle for the tilling of the county, began in turn to depend on the county of Aberdeen for their cattle supplies. The Aberdeenshire Horned breed had been evolved, and henceforth, for the space of a half to three-quarters of a century, it was to play an important part in the cattle industry of the country.

Scotch dealers, however, soon began to take an active share in the cattle-droving industry, and it is recorded of one of the earliest consignments of Aberdeenshire cattle taken to England that, on being inspected by some English dealers and graziers "of respectable character and great experience," they were declared to be "the best that had ever been driven from Scotland to England." Thus at the very outset did the Aberdeenshire breed take a leading place among cattle breeds; and for many years this position was maintained, the early acquired fame of the Aberdeenshire "runts," when sold in a finished state, being thus handed down through succeeding years to the present-day producers of "Prime Scots," a term which still in a pre-eminent degree distinguishes the finished article produced by the Aberdeenshire farmer.

At home, too, the Horned breed began to assert itself. Into the neighbouring district of Angus, where still lay in embryo the great black Polled race waiting for its Hugh Watson and its William M'Combie, the Horned breed spread in large numbers, the farmers there finding it a profitable business to acquire cattle of that breed, and either sell them as stores to the English dealers or fatten them for the Edinburgh and Glasgow markets.

Cattle-rearing in Aberdeenshire must have been a highly profitable business in these days, for records of one of the leading markets show droves of Aberdeenshire cattle being sold to English graziers at prices which farmers nowadays can scarcely get for their prime fat cattle.

It is recorded that about 1811 there were 110,000 "black cattle" in Aberdeenshire. What proportion of this total represented the Aberdeenshire Horned breed and what proportion represented the native Buchan cattle, it is impossible to say. Up to that date, too, it is recorded that the largest ox ever killed in the city of Aberdeen was the property of Mr Francis Garden Campbell of Troup, who took an active part in the cattle-breeding industry of a hundred years ago. The ox, it is stated, was reared at Delgaty, in the parish of Turriff, and was fed for three years, and weighed upwards of 115 stone English. It is impossible to say whether this ox was an Aberdeenshire Horned one or a Polled, the inference, however, being that he was of the latter type; for at a date some thirty years later it is recorded that, in the parish of Turriff, "the far-famed Aberdeenshire dodded breed" generally prevailed, and were carefully preserved in all their purity. This is just one of those points which make the history of the Horned breed so difficult to trace. It is equally difficult to trace the extent to which the Horned, as against the Polled, breed held sway in the county of Aberdeen. In the Buchan quarter of Aberdeenshire upwards of seventy years ago, Polled cattle were, as indeed from time out of mind, the principal breed; but over all the rest of the county, and especially in the high-lying districts, the Aberdeenshire Horned was still the preponderating breed. It may be taken as a general statement that more or less over the whole county of Aberdeen, with the possible exception of Buchan—though even there traces are found—the Aberdeenshire Horned breed for several decades in the close of the eighteenth century and the opening of the nineteenth, held sway, and was in fact the "preponderating" cattle of the county.

Perhaps the most authoritative source from which information can be drawn are the Statistical Accounts—the old Statistical Account of 1792 and the new Statistical Account of 1840. In the earlier of these works the writers content themselves with a most general reference to the "black cattle" of the parish. For instance, of Midmar we are informed that there were 525 black cattle, and of Keithhall and Kinkell that there were 1038 black cattle, representing a value of £3733. Of another parish it is reported that "the black cattle great and small exceed 600." This conveys no very definite information, but when read in the light of the New Statistical Account, written just a few years after the Shorthorn breed had been introduced into these Northern parts, a better idea is got of the extent to which the Horned breed was cultivated.

The appearance of the "Teeswater" bulls, as Shorthorn bulls were then often spoken of, and the results of the crossing craze that then set in, forced the writers of the various Accounts to differentiate more particularly as between the various breeds, a census of which could no longer be returned under the common head of "black cattle." The sifting and comparison of these two Statistical Accounts bring out the gradual ascendency of the Polled breed over the Horned breed, and then the total extinction of the latter before the inroads of the great southern intruder from the banks of the Tees, which even for a time seemed as if it would overthrow also the old Buchan race of hummlies.

The parish of Tullynessle may be taken as a typical Highland parish of the county of Aberdeen. There, about a hundred and twenty years ago, the leading variety, as one would naturally expect, was the Aberdeenshire Horned. They were of a rather small size, though hardy, and weighed fiom 18 to 30 stone Amsterdam. They improved very much when carried into richer pasture, and consequently brought good prices from the drovers. Mr Leith, the proprietor of Whitehaugh, who farmed a great portion of his own estate—nearly one-third of the parish—was one of the supporters of the Horned breed, and did a large amount of valuable work in improving it. So far was he successful, that his herd was drawn on largely by the leading agriculturists of the district. His cattle are described as being of a pretty large size, very handsome, and remarkably well horned.

But fifty years later this good work of the laird of Whitehaugh was beginning to be made of no avail. It had then to be recorded that "the Aberdeenshire breed at one time held nearly the exclusive possession of all the grass in the parish," but that now "a valuable cross breed between Aberdeenshire cows and Teeswater or Shorthorn bulls has been introduced by several farmers, and their example promises to be very generally followed. But the Aberdeenshire, after a certain age, is, in respect of quality, very generally allowed to be superior to all others, and the different agricultural associations throughout the country, while they give due encouragement to such crosses as are likely to prove profitable to the farmer, ought to pay particular attention to the due preservation of the pure Aberdeenshire breed." But alas for the "remarkably well-horned" cattle of Whitehaugh, the warning was not heeded, and within a very few years the "superior-to-all-other" breed was no more.

In the adjoining parish of Alford, interesting traces can also be found of the old Aberdeenshire breed. In 1793 it was recorded that there were 953 "black cattle" after the year's sales were over, and of these 346 were oxen for the plough. Forty years before that, from £1, 5s. to £1, 10s. was the price of a cow, but at the date quoted the price had increased to from £3 to £5. Still, however, the cattle, owing to their being poorly fed, were of a small size, and gave only from four to five Scotch pints of milk per day even in the best of grass. Fifty years later, it was recorded that black cattle formed the most important store beasts. The substratum of the races then was stated to be "the well-known long-horned black or brown Aberdeenshire breed, a healthy and handsome race, but small." The cows were reported to be great milkers, and the milk particularly rich.

This breed was then, however, rarely to be seen pure in the parish, although they were still kept pure in some of the parishes bordering on Alford. Then there is recounted the reason for this scarcity—the crossing with larger breeds till the cattle had lost "their characteristic horns."

In the uplying parish of Strathdon we find the same principle at work. This parish also had its M'Combie, just as Tullynessle farther down the Don had. This was the late Dr Forbes of Blelack and Inverernan, who at great expense succeeded in raising a "justly celebrated stock," which became widely diffused over the parish. It may be taken that this was one of the methods by which the Horned cattle came to be supplanted by the Polled. Upwards of seventy years ago the common breed of the parish was the Aberdeenshire, though the fashion was quickly changing in favour of the Polled.

An interesting glimpse of the cattle trade of over a hundred years ago is given in connection with the parish of Birse. About 1770, as the farmers did not breed cattle of sufficient bulk and strength to labour the ground, the cattle were mostly brought from the south, particularly from Fifeshire. In a few years by hard labour they were worn out, and became unfit for service, and as the farmers had not the means of fattening them, they had very often to sell them at one-third part of what they cost. Twenty years after that date, however, the farmers were reported to be breeding oxen fit for their own work, which would go to show that the Horned breed—the descendants of the imported Falklands and the native cattle—had by then become the established breed.

There may be briefly noted such other high-lying parishes as Tough, where three-quarters of a century ago the cattle were of the old Aberdeenshire breed, though crossing was then beginning to be largely resorted to; Crathie and Braemar, of which it is reported that "the small black Horned breed of cattle prevail here"; Lumphanan, where the pure Aberdeenshire breed of cattle, "which in many parts of the country is corrupted and ruined," was kept up, "an intelligent tenantry perceiving that it is much better suited to the soil and climate than those crosses which require rich and sheltered pastures to bring them to maturity"; and Aboyne, where the cattle were "generally of the Aberdeenshire Horned or of the Buchan Polled breeds."

An early improver of the cattle on Upper Deeside was Mr Farquharson of Invercauld, the points he cultivated being a great tendency to fatten, beauty of form, and at the same time a large quantity of milk, and richness in the quality of the milk. These cattle were crossed about 1748 with Fifeshire bulls, which made the cows larger, while the milk, it is stated, retained its original richness. It is thus seen that, even in the uplying parishes, the "black cattle" were more or less mixed, in that they comprised both the progenitors of the present-day Aberdeen-Angus cattle and representatives of the now extinct native breed of Horned cattle.

In view of the strenuous efforts that were made in the Garioch district of Aberdeenshire to preserve the Horned cattle, it is of interest to recall the conditions that prevailed in that part of the county. A typical parish may be selected in Rayne, where about 1840 the leading varieties of cattle reared were "the country breeds, horned and bald." Crossing with the Shorthorn was, however, then being prosecuted, and thereby greater weight and size were being obtained, but not, it was thought, increased fineness in the quality and grain of the meat. Another typical parish is that of Chapel of Garioch, where over a hundred years ago it is stated that the cattle then produced were "of the common north-country breed." Mr Leslie of Balquhain about that time introduced what the chronicler calls the "Galloway kind," stating that they were much esteemed as being hardy, large-boned, and well-shaped. A quarter of a century later, it is stated that the great proportion of the cattle of the parish were of the Aberdeenshire Horned and Buchan Polled breeds, with a cross between the two. Regarded as a pure breed, however, there were very few of the Aberdeenshire Horned cattle; but it is then stated that the proprietors proposed to give premiums in order to encourage farmers to rear a greater number of this breed, "which are much admired both for their symmetry and many valuable qualities, and which would make their total loss a matter of serious regret to the agricultural interest." In Kintore, seventy years ago, the farmers are reported to be paying much attention to the Aberdeenshire breed, "so as to have them of a good figure and free from horns." Again, in Tarves parish—the home of the greatest of our present-day Shorthorn herds—it is stated that the breed was formerly of the long Horned Aberdeenshire breed, but these were succeeded by the Polled breed of the district of Buchan.

We have thus a definite case of the old Horned breed being ousted from public favour, not so much by the introduction of the Shorthorn as by the assertion of the other native breeds of the county. In the parish of Gartly it is reported that the cattle of over a hundred years ago were "generally small, but of a very tight Highland breed." It is interesting to recall that the Horned breed of the county had long a home at the farm of Collithie in this parish, Mr James Pirie, who preceded Mr Bruce as tenant, having exhibited cattle of the breed up to 1847 at least. In Keig also we find that the race of cattle generally preferred was of the Aberdeenshire Horned breed. In the centre of the Garioch district is the parish of Keithhall and Kennethmont, where it is reported (1840) that several farmers had very superior cattle, chiefly of the old Aberdeenshire breed.

Lord Kintore took a large part in the cattle-breeding of that time, cultivating both Ayrshires and Shorthorns. We know, however, that his lordship was also a very warm supporter of the native Horned breed. It was he who bred the famous Kintore ox (fig. 20) which won a first prize at the Highland and Agricultural Society's Show in 1834. This ox was bred in 1827, and is stated to have been a cross between a Teeswater bull and an Aberdeenshire cow. The ox was quite a marvel in his day, and was taken through the country and exhibited as a great curiosity. A portrait of Lord Kintore showing the ox was purchased at a sale at Dunlugas—where his lordship spent a large part of his time, and kept as a hunting seat—by Mr Leith E. Longmore, Baldavie, Boyndie, in whose possession the picture still remains. The ox is stated to have been sold when seven years old for 100 sovereigns, and its gross live-weight is stated to have been 1 ton 8 cwt.

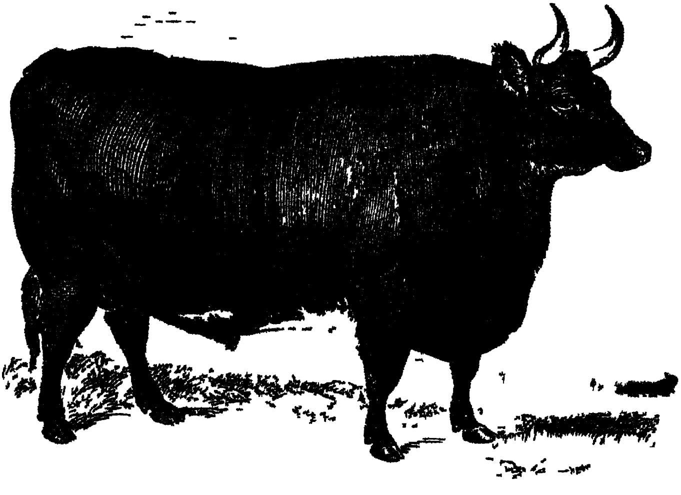

Fig. 20.—Kintore Ox

A glance at the cattle-breeding industry of the Buchan district will also reveal the presence of the Horned breed there; for though in many cases the native breed of that district were kept pure, in Buchan, as in other localities, it was more often the case that both Horned cattle and "polled," "bald," or "hummel" were kept in the same herd. Writers of seven decades ago nearly all join in regretting the great extent to which the system of crossing was being pursued, and give expression to fears that the native breed of the district, "the old Aberdeenshire breed," may wholly disappear. This, in a district which is one of the peculiar birthplaces of the Aberdeen-Angus breed of the present day, must of course be taken to mean Polled cattle; but that there were many black Horned cattle is also without doubt. Thus of the parish of Udny it is stated that, though "much attention has of late been paid to the improvement of cattle by importing breeds from Kirkcudbright and Durham, the Aberdeenshire breed, mostly black without horns, suit the country best." In Old Deer, the prevailing species of black cattle was the "dodded or humble"; while in St Fergus the "Aberdeenshire and Buchan, and a nondescript result of crosses from them," were the only kinds of cattle reared till the introduction of the Shorthorns.

In the case of the parish of Lonmay we have this interesting review: "It is well known that Buchan has been long celebrated for its cattle. Formerly an improved cross from the Highland small Horned bull with the larger cow of this country was in high esteem, both for symmetry, compactness, and weight. The Polled or dodded cattle succeeded, and for the last twenty years [say from 1810] were in great demand, and indeed still bear a high price in the southern markets, and the top price in London. The Shorthorn cattle, however, are beginning to supplant our own Buchan breed, but considerable difference of opinion prevails as to their comparative merits. One disadvantage belongs to the large Shorthorned ox, that he is too heavy in the carcase for driving to a distant market."

In this last sentence we have one of the chief causes for the disappearance of the black Horned cattle of Aberdeenshire. As droving cattle they excelled; but when droving became a thing of the past, then there had to be found some other type of beast better suited to the changed conditions of the cattle trade. In the same way, in the parish of Ellon almost the only breeds of cattle were the "Aberdeenshire Horned and the Angus Polled" breeds, but the Shorthorn breed was reported to be "now prevailing to a considerable extent." The same thing was going on all round, and nowhere more rampantly than in the ancient Thanedom of Formartine, though the agricultural association there, when started, had for its chief object "the improvement of the breed of black cattle."

Records show also that in some parishes, besides the aggressions of the Shorthorns, the native breeds were subjected to the rivalry of the Hereford; but that breed does not seem to have gained any very extensive footing. It is interesting, however, to note its presence in the dawning of the present-day era of cattle-breeding in Aberdeenshire. Indeed, the Hereford breed has no small place in the county's early days of cattle-feeding, for it was with a Hereford ox that Mr Wm. Hay, Shethin, gained a prize at the Smithfield Show—the first occasion upon which any of the premiums of that club were won by an Aberdeenshire feeder.

The chronicler for the parish of Auchterless, which lies just on the borderland between the Buchan and Garioch districts, records that about 1780 the cattle of the district were crossed with the old Fife breed, and these produced the "far-famed Aberdeenshire stock. There have been various unsuccessful attempts to improve this species, first by the Lancashire and afterwards the Galloway. Efforts are now (1840) being made to improve it by means of the Shorthorn. Whether these will be more successful, time can only show." The success of the efforts may be judged from the fact that now, at the close of little over half a century, Auchterless may be searched up and down, but in vain, for a specimen of the "far-famed Aberdeenshire stock."

In the neighbouring parish of Fyvie, the cattle of sixty or seventy years ago were chiefly of the "old Aberdeenshire Horned, and dodded or hummel breed." This quotation from the Account of the Parish of New Machar has a special interest: "The cattle reared are either the Aberdeenshire Horned or dodded, or crosses with the Shorthorn and Hereford breeds. The policy of corrupting the native breeds of the country is still a *quæstio vexata* which time and more experience only can solve." As to the settlement of this *quæstio vexata,* there need only be recalled that three miles from New Machar railway station is the farm of Sittyton, the scene of the life-work of the Brothers Cruickshank.

As was but natural to expect, the Aberdeenshire Horned cattle were not confined to the strict geographical area of that county. They were also reared in the adjoining county of Banff, but there they were known as the "Banffshire breed." In the district around Banff much encouragement was given to the feeding of cattle in the early days of that industry, for as early as 1826 the farmers in the district were sending cattle direct from Banff to London by sea; and during one year alone well on to five hundred cattle were thus exported from the harbour of Banff. With this facility at their doors, farmers near the coast gave up the store cattle trade for the feeding of cattle at an earlier date than those living farther inland, and in the Banff district crossing was so extensively followed that the system occasioned "the loss of a very good breed formerly known by the name of the old Banffshire breed."

In Forglen, at the same date, the Aberdeenshire breed still existed, along with the Buchan breed; while in Boyndie the cattle are described as having been of the Polled Buchan or of the Banffshire breed with horns. The Shorthorn bull was introduced to this parish by Mr Wilson, Brangan, in 1829, and a dozen years later there were reported to be four or five bulls of that breed in the parish.

The question as to whether the Banffshire breed was the same as the Aberdeenshire breed is settled by the chronicler for the parish of Alvah, who goes on to remark that the only remarkable alteration that had taken place for some years prior to 1840 was the great increase of Hummel cattle compared with the number of Horned. He adds that by graziers and by the best judges this alteration was considered an improvement, but that about twenty years before a different opinion prevailed, when a good show of horns was a point much valued.

In the large parish of Fordyce the general breed was a cross between the "old Banffshire breed and the Buchan humble breed"; but, it is added, "the pure Banffshire breed is now (1840) seldom seen." That the prevailing breed prior to this date was the Horned cattle may be gathered from the following facts. In 1770 a remarkable murrain broke out amongst the black cattle of the parish. It arose from some tainted hay imported from Holland. So great was the disorder that it attracted the attention of the Government of the day, and to prevent the contagion from spreading orders were sent down to have all the "black cattle" within a certain distance slaughtered on their showing any symptom of the disease, the owners being indemnified by the Government. One of the symptoms of the disease was a heating in the horn—a remark from which it may be gathered that the breed of the period was the old Banffshire Horned breed.

One of the most interesting references to the breed occurs in connection with the parish of Rathven, where prior to the middle of the nineteenth century the Aberdeenshire breed is recorded to still be the prevailing cattle in the district. The chronicler proceeds to state that "dealers who purchase the cattle for the south are somewhat particular with regard to what they call points of form and colour. These points are short legs, a fair proportioned round body, straight along the back, and, in their third year, a long slender white horn tipped towards the point with black. The favourite colour is pure black. The brindled ranks next in esteem, and the dun is not disliked. Pure white or streaked are counted inferior. One farmer lately introduced the Teeswater breed, but he very soon found that he had neither sufficient quantity of grass nor requisite shelter for such heavy stock." From this quotation may be gathered the hardy nature of the old Banffshire race, which, as one chronicler puts it, was in so many cases "sent to pasture on a heather hill."

Naturally Mr M'Combie of Tillyfour (1805-1880), the great outstanding figure in the emancipation of one of the native breeds of the county of Aberdeen, came largely in contact with the Horned breed; and though his attention was latterly turned to the Polled breed, and to the frustrating of the trend of the day towards the extinction of that breed, he has in his 'Reminiscences,' written in 1875, something favourable to say of the other breed, which, despite efforts in other quarters, has now been completely lost to the country. He recalls that there was a great trade with Cumberland at the Falkirk Michaelmas Tryst for Horned Aberdeen cattle. The native breed of small long-horned cattle of that county, though answering well for the dairy, did not prove so profitable as grazers, and accordingly there was a large demand for such a profitable grazing breed as the Horned cattle of Aberdeenshire. The animals were sent from Cumberland to Barnet in spring, and sold off the marshes fat in July and August. Mr M'Combie's best sixty generally commanded the highest price, and he notes that his great opponent in the Horned cattle trade was the late Mr William Thom. The great deliverer of the Buchan humlie sent for many years sixty Horned cattle in spring to Mr Buist, Tynningham. They were grazed at Tynningham Park, and Mr Buist also required other forty or sixty during the season for house feeding, so that we may conclude that the Horned cattle were good feeders both in the field and in the stall.

In course of time, however, Irish-bred cattle and then the Shorthorn began to appear in the Falkirk Trysts, and the business of dealing in north-country cattle came to be worthless. It was then that Mr M'Combie gave up the lean cattle trade, and—momentous day for the Aberdeen-Angus race!—turned his attention to the rearing and fattening of cattle at home. "Rent payers" the Aberdeen cattle are termed by Mr M'Combie, who also remarks that he would be prejudiced indeed who would not acknowledge their merits. The transactions recorded by Mr M'Combie of various dealers show the great part which the Aberdeenshire Horned cattle played in the cattle industry of the country upwards of three-quarters of a century ago, while it is not unseldom that he quotes figures to show that at some of the leading fairs the now extinct breed topped the selling lists.

Having traced their rise, and indicated the extent to which the Aberdeen Horned cattle in their comparatively brief existence spread, there may now be noted some of the circumstances connected with their disappearance. In 1822, when the Highland and Agricultural Society held its first show, the live stock included representatives of the Horned breed, though they were shown along with the Polled breed under the general title of the Aberdeenshire breed. In 1831, when the Society held its first show at Inverness, there was no competition for the prizes offered for the Aberdeenshire Horned breed; and at the first show at Aberdeen, held three years later, there was only the small representation of one bull and eight cows, the bull being shown from Gordon Castle. The Duke of Richmond and Gordon was a warm supporter of the old breed, and as late as 1858, at his tenants' show at Fochabers, there were shown by a small crofter two cows and a heifer of the Aberdeenshire breed.

In 1835 there was presented a report to the Highland and Agricultural Society dealing with the classes of stock which should be encouraged by the Society at the shows, and in the enumeration of the breeds the Horned Aberdeenshire has no place. At that time it seemed that the interests of the breeders of the district were leading them to rear the hornless in preference to the Horned breed, and it was the view of the Society that it was not for them to attempt, by the offer of premiums, to revive its cultivation. An exception was, however, made in 1840, when the Society held its show at Aberdeen, prizes being offered for bulls, cows, and oxen of the Horned breed. Two bulls were forward—one from Mr Alexander Keith, Netherthird, and another bred by Mr James Allardes, Boyndsmill, and shown by Mr George Gordon, Bucharn. At that show Mr M'Combie was one of the prize-winners—the first time his name occurs in the lists of the Society. At Inverness, in 1846, there was only one entry in each of the four classes, while at the Aberdeen Show in 1847 there were no bulls, though there were fourteen cows and three heifers.

When in 1858 Aberdeen was again visited by the Highland Show, the breed was unrepresented altogether. By this time the Royal Northern Agricultural Society had come into existence. At its first show in 1844 there was a full classification for the Aberdeenshire Horned breed, but here too it was soon unrepresented. The most strenuous endeavour to retain the breed was, however, made by the Garioch Farmer Club, which has its headquarters at Insch. The poor display which the breed made at the Highland Show at Aberdeen in 1834 gave rise to the apprehension that, if not properly attended to and encouraged, the pure breed of that very valuable description of stock would soon be entirely lost. By the offer of special prizes this local society was able to get together nine bulls and sixty-three cows and heifers, and in subsequent years the breed was represented—in diminutive numbers, however—until, by 1855, they had disappeared altogether. Indeed, for about eight years previous to that there had been no bulls of the breed shown, competition latterly having been confined to cows and heifers.

Just as it is impossible to say when the breed was first recognised, so it is equally impossible to say exactly when it died out. So far as is known, the last pure representative of the breed died eighteen years ago. This was a cow bred at Cevidly, and owned by the late Mr Ronald, Pitbee, Pitcaple. She had the arching white horns and the waving tuft of black hair on the crown of the forehead, indicative of a pure descendant of the breed. When she died she was twenty-five years of age, and had produced no fewer than twenty-three calves. At twenty-five she had twins. Every one of the bull calves she had were horned, but of the heifer calves only one was horned. At Mr Ronald's dispersion sale in 1893 there was included a daughter of this cow by a Polled bull. The daughter was then eighteen years old, and had the characteristic tuft on the forehead, but was minus the horns.

Various references go to show that as a breed the Horned cattle were marked by great hardiness of constitution and were long livers, while the cows were both prolific and great milkers. The Banffshire cattle were somewhat smaller than those raised in Aberdeenshire, but they were of finer symmetry. For the era of early maturity, however, they were not so well suited as their more fortunate rivals, the Aberdeen-Angus breed. In the days of droving they were prime favourites with the dealers. Long distances had then to be traversed on foot, and all who can recall the Horned cattle testify to their pre-eminent suitability for droving, being hardy and superior travellers. They were large and strong in the bone, and as a race inclined to be narrow across the back, though the great depth of chest by which they were characterised perhaps made this narrownes more outstanding than it otherwise might have been, the chest being much deeper in proportion to the circumference. A great point with fanciers was the shape of the horn, which was long and arched inwards, of a pure white colour with tips of black.

As can be fancied, a drove of some hundreds of these cattle —with their nice springing black-tipped horns, their small heads, broad between the eyes, and with short muzzles—had a very "taking" appearance, and when their many qualities of endurance and usefulness are considered, it is little wonder that for many years they played an important part in the live-stock transactions of the country.

But the Aberdeenshire breeder soon found that it paid him to turn feeder too: other qualities than those of being good droving cattle were called for, and these were not found in the

Horned breed of the county. Accordingly, slowly but surely they had to give way before the encroachments of the Shorthorn and Buchan cattle, which, with their crosses, were found to possess those requisite properties that have given to Aberdeenshire an honoured name in connection with the fat cattle trade of to-day, just as the Horned breed gave to the county an honoured name in the lean cattle trade of the droving days.

TRIALS OF SUCTION GAS-PRODUCER PLANTS.

THE chief object which the Directors had in view in conducting these trials, which took place in the Glasgow Show, was to afford members of the Highland and Agricultural Society and others an opportunity of becoming better acquainted with the combination of the "Suction" gas-producer and gas-engine as a cheap and convenient source of power, and at the same time to demonstrate that the suction gas-producer is a practical and simple appliance.

The Society reserved the right to test the power and working of each engine and plant as considered desirable, also to make notes and observations of the same for incorporation in an official report of the trials.

The Society provided space in the showyard, free of charge, to exhibitors submitting plants for trial.

No awards were made, and the trials were arranged so as to test the plants as nearly as possible under their ordinary working conditions.

It was suggested to intending exhibitors that each firm should submit for trial two complete plants, consisting in each case of gas-producer, scrubber, &c., and gas-engine of suitable power.

The plants were to be of the following capacities:—

(*a*) Capacity, 15 to 20 B.H.P. at full working load.
(*b*) " 5 to 8 " "

No restriction whatever was imposed upon the exhibitors with regard to the size and capacity of the generators.

Ten complete plants, exhibited by six firms, were submitted for trial. The chief particulars of these plants are given in the following table:—

TABLE I.—GENERAL DIMENSIONS AND PARTICULARS OF PLANTS ENTERED FOR TRIAL.

PLANTS OF ABOUT 20 BRAKE HORSE-POWER CAPACITY.

Exhibitor	The Acme Engine Co., Shettleston, Glasgow.	The Campbell Gas Engine Co., Halifax.	Messrs Crossley Bros., Openshaw, Manchester.	The Industrial Engineering Co., Hyde, near Manchester.	The National Gas Engine Co., Ashton-under-Lyne.	Messrs Tangyes, Ltd., Birmingham.
Declared capacity of gas-producer plant, B.H.P.	25	18	24	25	20	21
Price of gas-producer plant, complete	£94, 10s.	£105	£80	£72	£80	£90
Total weight of plant, cwts.	35	25	45	25	25	28
General description of engine	"Acme"	"Campbell"	"Crossley"	"Acme"	"National"	"Tangye"
Declared brake horse-power of engine	22	18	16	22	20	19
Diameter of cylinder, inches	10	9½	8½	10	10	10
Stroke, inches	17	18	20	17	18	19
Revolutions per minute, declared	220	200	200	220	190	190
Price of engine, complete	£130	£125	£110	£130	£120	£131
Weight of engine, cwts.	60	66	54	60	78	69
Price of producer plant and engine, complete	£224, 10s.	£230	£190	£202	£200	£221
Space taken up by complete plant — producer, engine, &c., sq. ft.	144	225	240	288	225	225

PLANTS OF ABOUT 8 BRAKE HORSE-POWER CAPACITY.

Exhibitor	The Campbell Gas Engine Co., Halifax.	The Industrial Engineering Co., Hyde, near Manchester.	The National Gas Engine Co., Ashton-under-Lyne.	Messrs Tangyes, Ltd., Birmingham.
Declared capacity of gas-producer plant, B.H.P.	8	10	10	12
Price of gas-producer plant, complete	£80	£60	£65	£58
Total weight of plant, cwts.	25	15	20	17
General description of engine	"Campbell"	"Acme"	"National"	"Tangye"
Declared brake horse-power of engine	8	13½	8	7½
Diameter of cylinder, inches	7	8½	7	7
Stroke, inches	12	14	15	16
Revolutions per minute, declared	230	230	220	220
Price of engine, complete	£80	£75	£80	£90
Weight of engine, cwts.	29	25	40	40
Price of producer plant and engine, complete	£160	£135	£145	£148
Space taken up by complete plant—producer, engine, &c., sq. ft.	160	288	225	160

DESCRIPTION OF PLANTS.

The economic results to be obtained from the use of "producer" or power gas, as distinguished from town's gas, as the motive agent for driving gas-engines have been well known for a number of years; but until recently producer plants were all on the "pressure" system, which requires a steam-boiler and a gas-holder for each plant. These pressure plants, of which there are a great number working successfully, are mainly used for supplying gas to large engines; and their initial cost, space occupied, and attention required render them unsuitable for the small power user.

During the last few years some very important improvements have been made in the apparatus for the production of a cheap gas for power purposes, and the small and comparatively inexpensive form of plant, which was the subject of the trials at the Glasgow Show in 1905, is the result.

A "Suction" gas plant consists of (1) the generator or producer in which the gas is made; (2) one or two scrubbers filled with coke through which water is allowed to trickle for cooling and cleaning the gas; (3) an expansion box or chamber between the scrubbers and the engine,—the object of this chamber is to equalise the pull from the engine, and it takes the place of the gas-bag used in connection with engines worked from pressure gas.

The engine is in direct communication with the generator through the expansion chamber and scrubbers, and the suction stroke of the engine creates the necessary vacuum whereby the gas is drawn from the generator. It is an interesting and outstanding feature of this system that under normal working conditions the gas is generated only as required by the engine.

When the plant is in operation the pressure within the generator, scrubbers, &c., is less than that of the atmosphere, consequently there can be no gas leakage.

The illuminating power of producer gas is very small, and its heating value is only about one-fourth that of ordinary town's gas; but it can be made at a very cheap rate. There is no doubt that where coal is the basis of power the best and most economical way of using the coal is to convert it into producer gas.

Anthracite "peas" or good gas coke is the usual fuel used in these plants, as the presence of bituminous matter in ordinary coal results in the formation of tar, which interferes seriously with the working of the engine.

To start the generator it is necessary, in the first place, to blow the fire into a state of incandescence by means of a small fan driven by hand,—this usually takes about twenty minutes,—after which the action of the plant is entirely automatic, the quantity of gas generated and the fuel consumed being regulated exactly by the demands of the engine.

During the first part of the starting operations the gas passes through an escape- or waste-pipe to the atmosphere. At the expiration of about fifteen minutes from the start a cock on the waste-pipe is closed and the gas is blown by the fan through the scrubbers, &c. The expansion box or the pipe leading to the engine is fitted with a test cock, and after all the air in the apparatus has been expelled through this cock a light may be applied. At first the gas will burn with a light blue flame, but as the blowing proceeds further the flame will become orange-coloured: this indicates that the gas is good, and the engine may be started.

The principle of action in all suction gas-producer plants is practically the same. The gas is obtained by passing air and steam through incandescent fuel: the combustible portion of the gas consists of carbon monoxide, hydrogen, with a little marsh gas, the non-combustibles being carbonic acid gas and nitrogen.

From an examination of the various plants hereafter described and illustrated, it will be seen that the chief difference lies in the construction and design of the generator.

The fuel is fed into the generator or producer through a hopper fitted with a gas-tight valve, and descends to the working level of the fire. The hopper is also provided with a door at the top, so that by opening one and closing the other each charge of fuel may be fed into the producer without admitting air.

The top of the generator is usually provided with a water chamber, variously called a "saturator," "vaporiser," or "boiler," and the heat from the escaping gas passing round this chamber is sufficient to vaporise or convert some of the water into steam, which is drawn, along with the necessary air, through a pipe to the closed space underneath the fire-grate of the generator, and finally through the incandescent fuel.

The floor space occupied by a suction gas plant is very small, and little attention is required once it is started, fuel being supplied about every two or three hours.

Any clinker that may form in the lower part of the generator can be removed through the fire doors.

The top of the generator is provided with poke-holes, through which a bar or poker can be introduced for removing any clinker that may attach itself to the firebrick lining, and for breaking up the clinker formed immediately above the grate. All operations connected with the generator can be carried out while the plant is at work.

The water consumed for all purposes—generator and scrubbers—does not usually exceed one gallon per brake horse-power per hour.

A short description is given below of the various plants submitted for trial.

The gas-engines were of the ordinary type, and fitted with magneto-electric ignition.

The "Campbell" Suction Gas Plant.

This plant is represented in fig. 21. The gas-producer or generator consists of a riveted steel vessel lined with firebrick, and provided at the top with a cast-iron evaporator or vaporiser, which contains the water to be used as steam in the formation of the gas. The supply of water to the evaporator is so regulated that the discharge from the overflow pipe should issue in drops, which are caught by a U pipe and conducted to the ash-pit. An air inlet is mounted on the top of the evaporator, which is connected with the ash-pit by means of the pipe shown at the side of the producer. The producer is provided with two large doors, through which easy access is obtained to the fuel on the grate and to the ash-pit respectively, for cleaning purposes. A poker hole is also provided in the upper door for stirring the fire.

A separator is arranged between the producer and the scrubber for the purpose of retaining the heavier particles of dust which are carried over by the gas from the producer. This dust is deposited in an open hydraulic box or water-seal, into which a pipe connected to the bottom of the separator dips. The waste gas-pipe is shown connected up to the pipe leading from the separator to the scrubber.

A water-seal, E, is fitted to the bottom of the coke scrubber, and acts as an automatic non-return valve. The scrubber is furnished at the top with a rose, through which the water for washing the gas is sprayed on to the coke; as the gas rises through the coke all the impurities remaining in it are filtered out before it passes to the engine.

The gas-box is seen to the right of the scrubber.

In this plant the whole of the vessels forming the main and most important parts are constructed of steel plates with riveted joints. The doors on the hopper and on the side of the producer are of large dimensions, so that the whole of the inside of the producer is easily accessible for clinkering, removal of ashes, &c.

The cover of the evaporator is removable so that the interior can be cleaned.

The producer is of large capacity, so that it requires stoking at long intervals only.

The "Crossley" Suction Gas Plant.

The following illustration (fig. 22) gives a sectional view of this plant.

The firebrick lining, which is separated from the outside casing by a layer of sand, rests on a metal ring supported on

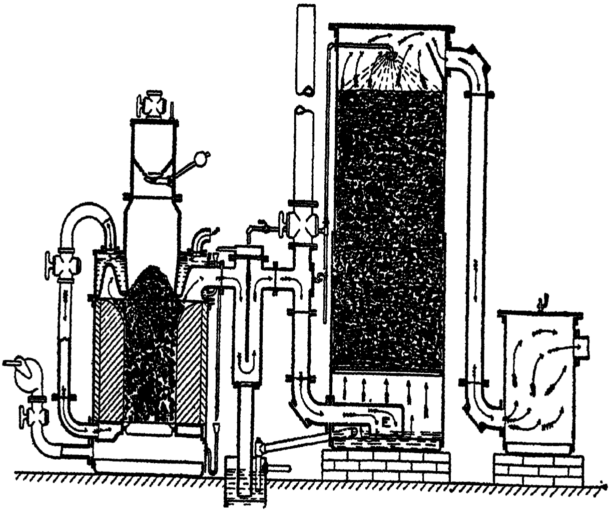

Fig. 21.—*The "Campbell" Suction Gas Plant.*

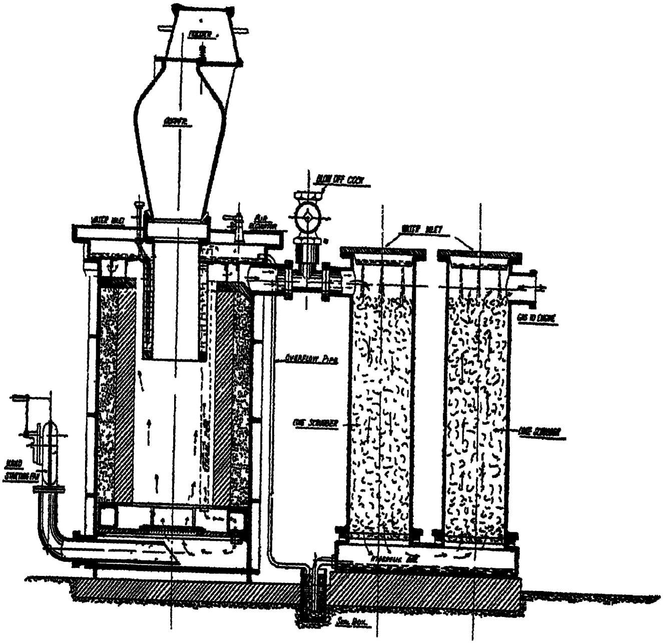

Fig. 22.—*The "Crossley" Suction Gas Plant.*

two cast-iron segmental-shaped boxes termed "superheaters," placed at the hottest part of the fire and mounted on a flat plate carried right across the producer. This plate has a hole in the centre in which rest the bars of the fire-grate. In this way a pit is formed immediately below the fire-grate, and in this pit the steam and air mix before passing through the fire.

Around the cylindrical "bell," defining the depth of fuel in the producer, is formed the "well" of the saturator or vaporiser. Cold water is introduced into the bottom of this well, and fills the rest of the vessel to a level defined by an overflow pipe. The saturator is shaped like a flat dish extending to the outside shell of the producer. This dish has a series of baffle plates on its under surface, forming passages through which the hot gas has to pass, giving up its heat to the water before going to the two coke scrubbers.

Two vertical steam pipes connect the saturator with the superheater. Ample provision is made for clinkering, cleaning the fires, &c.

The "Industrial" Suction Gas Plant.

A view of this plant is given in fig. 23. The fuel rests upon the brick bottom of the producer without any other support. The firebrick lining is carried upon a plate at some height above the bottom, so as to leave a space below the lining for the steam and air to enter round the *sides* of the pile of fuel. The top of the producer is also lined with firebrick.

The gas after leaving the producer passes twice (down and up) a separate vessel or pipe, V, forming the vaporiser, provided on its outer surface with a spiral rib down which water is allowed to trickle, and is formed into steam by the heat from the gas. The water before entering the vaporiser is heated by passing through a coil, C, in the upper part of the producer. The necessary air is drawn in through a series of holes at the top of an outer envelope or casing, D, which is connected to the bottom of the vaporiser at A. The air passes up through the vaporiser, mixing with the steam formed therein. The mixture of steam and air is then conveyed by a pipe, B, to an inner envelope, E, which is in communication with the space round the fuel at the bottom of the producer.

The scrubber is of special form and of large diameter. The water is sprinkled over the top of the coke through an automatically revolving pipe, P. The top of the scrubber forms a dome from which the engine draws its supply of gas, a separate expansion box being unnecessary.

A suction fan, F, is provided for starting purposes.

The hopper is fitted with a rotating charging device, H.

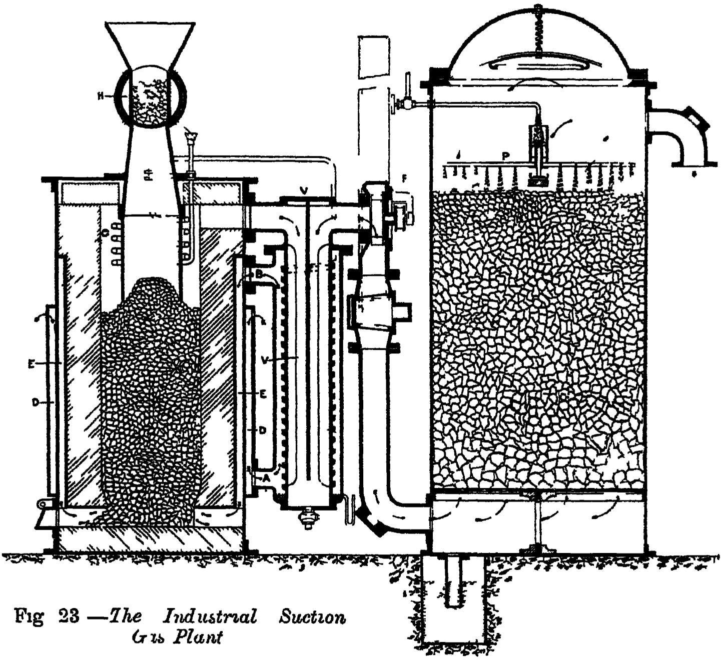

Fig 23 —*The Industrial Suction Gas Plant*

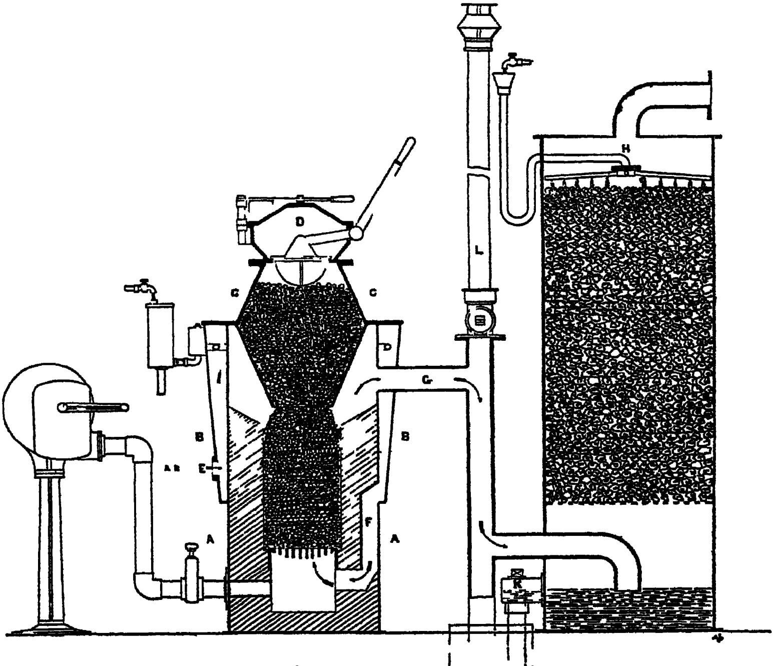

Fig 24 —*The "Dowson Suction Gas Producer*

The "Dowson" Suction Gas-Producer.

The National Gas Engine Co. used this producer (fig. 24) in combination with their engines during the trials.

It will be seen from the accompanying illustration that the upper part of the generator is surrounded with a jacket, B.

The plant works on the regenerative principle; the air, which enters through a hole, E, near the bottom of the jacket, is heated by the gas on its way to the scrubber,—this heat otherwise would be wasted.

The water from which the steam is formed is kept at a constant level in a vessel outside the generator, and is discharged from a perforated pipe forming a ring in the upper part of the air jacket. Special means are adopted for regulating automatically the production and admission of the steam required for varying loads.

The mixture of steam and air is drawn from the jacket by the suction stroke of the engine into the space below the fire-grate, and finally through the fuel, where it is formed into combustible gas.

There is one door which is common to both fire-grate and ash-pit.

From the construction of the upper part of the generator it is evident that the waste heat is also utilised for heating the fuel before it reaches the combustion zone, consequently very little heat is lost.

The arrangement of scrubber, water-seal, &c., will be easily understood from the illustration.

The "Tangye" Suction Gas-Producer.

In this plant (fig. 25) the vaporiser is fitted above the firebrick lining, and carries the fuel chamber and hopper. Air is drawn through the bend on the top of the vaporiser across the heated water in the same, where it takes up and becomes charged with steam produced by the heat from the gases, &c., inside the generator. The mixture of air and steam then passes down the side pipe to the bottom of the generator.

The vaporiser is kept nearly full of water, the overflow being carried down into the ash-pit where it gives off additional steam or vapour produced by heat radiated from the hot fuel, and also from the hot ashes falling into the water. Any excess of water is carried away by means of a pipe and bosh, and forms a seal.

The lower end of the pipe connecting the generator with the scrubber forms a regulating water-seal box. By closing the cock in the lower pipe, the water from the scrubber must pass through the upper pipe, thus filling up the box above the lower part of the projecting diaphragm and preventing diffusion of the gas from the scrubber when the plant is shut down.

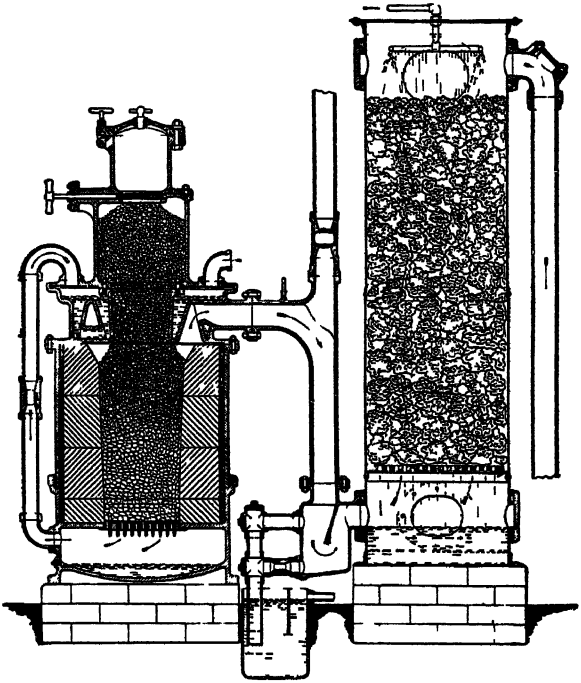

Fig 25.—*The "Tangye" Suction Gas Producer*

REPORT ON THE TRIALS.

All the engines, with one exception, were fitted with indicator gear, and provided with revolution and explosion counters.

The indicators used throughout the trials were of the "M'Innes-Dobbie" external spring special gas-engine type, supplied by Messrs Dobbie, M'Innes, Limited, Glasgow. The diagrams obtained were uniformly good and reliable, and show an entire freedom from vibration. At the conclusion of the trials, the indicators were carefully examined and found to be in perfect condition—the pistons moving freely and the parallel motions being without shake at any of the points.

Scotch anthracite "peas" from Gartshore Colliery, and supplied by Mr James Cunninghame, 12 Waterloo Street, Glasgow, was used throughout the trials. This coal cost 9s. 3d. per ton delivered in the showyard; it was of good quality, and none of the plants appeared to experience any difficulty in using it satisfactorily.

The coal was filled into bags from a truck, each bag containing approximately one cwt.

Every effort was made to have the coal thoroughly well mixed, so that each plant should be using coal of equal quality. Samples of the coal as supplied to each producer were taken, and found to be as nearly as possible of the same calorific value.

Previous to the commencement of each trial the producers were charged with sufficient coal—which was not weighed—to bring them up to their proper working condition, and the plants were required to be ready and working steadily for thirty minutes before the time of starting the trials.

In each of the power tests the time of starting was taken when the producer was filled with fuel to a predetermined level, the ashes and clinker as far as possible having been previously cleaned out, and the engine working steadily at the stated load. At the end of the test the producer was brought as nearly as it was possible to judge to the same condition as to fuel, &c., as at the start, and the fuel consumption determined from the amount introduced into the producer during this period.

At the beginning and end of each test the mass of fuel in each producer was consolidated as much as possible by working it from the top with a poker, in order to break down any arches that might have formed in the lower part of the producer.

It is a well-known fact in connection with suction gas-producers that after a few hours' run clinker forms in the generator, and, unless broken down by bars from the outside, it is apt to cause a hollow space in the fuel bed. Great care had to be exercised in removing the ashes and any clinker from the back of the fire, to prevent the main body of the fuel in the producer from coming down. In those producers which were provided with two or more doors on the grate level this difficulty was not so serious.

Some designers of suction plants hold that the anthracite in the lower part of the producer should be disturbed as little as possible; but with a low-class quality of fuel liable to clinker, it is obvious that some adequate provision should be made for readily removing the clinker, &c.

Any unburnt fuel that was unavoidably extracted while clinkering was carefully picked out and returned to the producer.

In spite of every precaution that could be taken, it was felt that certain errors of measurement with regard to fuel consumption were possible, and on that account the results given later should be taken as tentative.

Each plant was *required* to undergo a full and half power trial of *not less* than *ten* hours' duration, also a light load trial for a period of five hours.

It was also stipulated that not more than *two* men would be allowed to look after and attend to each plant (producer and engine).

By making the duration of each power trial ten hours, it was considered that any error in arriving at an estimate of the fuel consumption would be minimised; at the same time, in view of the very small amount of coal used in the majority of the plants, it is necessary to draw attention to the fact that the fuel consumption obtained may be slightly under the true value, though the degree of error cannot be large.

In the light load test the coal consumption was not measured, as the object was rather to ascertain the capabilities of the producers to supply gas to the engines when running without any load.

All the plants that were tested completed this light load trial satisfactorily.

If they desired, exhibitors were allowed to remove any ashes or clinker from the producers in the course of and at the end of the full and of the half load trials. This was done with all the producers except the Dowson producers, which were worked by the National Gas Engine Co., and which were not cleaned out till the close of the third test.

At the end of the power and light load trials all the producers were thoroughly emptied and an examination made for clinker. It was originally intended to weigh the ashes and clinker, but unfortunately on account of an accident this became impracticable.

On the whole, it was considered that the total amount of clinker formed during the trials was practically the same in each plant. The amount was very small, and did not appear to have any disadvantageous effect on the working of any of the plants.

In arriving at an estimate of the coal consumption of the National Gas Engine Company's plants, it was felt that owing to the clinker not having been removed from the producers at the end of the full and half load trials a certain amount should be added on to the observed consumption. This has been done. The efficiency of the plants is in no way detracted from by this.

After the producers had been emptied and allowed to cool, a further test was made to ascertain the length of time required to get up to full working load, starting with the producer empty and cold. The time occupied was taken from the moment of inserting the firewood until the engine was carrying the same load as during the full power trial, and this load it was required to sustain for twenty minutes.

The average time required for this test seemed to be about fifteen minutes. A tabulated list of the times taken by the various plants is given later.

Two of the plants—The Acme Engine Co. and The Industrial Engineering Co. (large plant)—were not subjected to any complete tests. This was no doubt due to the fact that the engines had not been properly tested before being erected in the test shed, and in consequence they stopped running on several occasions owing to defective ignition and other causes. So far as could be ascertained, the stoppages in these two plants were not due to any defect in the gas-producer.

The plant supplied by Messrs Crossley Bros. did not complete the full power trial owing to the producer failing to supply gas, and it was compelled to stop at the end of 8.12 hours. This is greatly to be regretted, as the plant was doing good work, and no doubt it could have completed the trial satisfactorily but for an error of judgment on the part of the attendant with regard to the manipulation of the plant.

The small plant exhibited by The Industrial Engineering Co., after having satisfactorily completed the full power trial, was compelled to stop on the half load trial after running for 8.43 hours. This was attributed to the presence of moisture on the igniting points in the engine, but it was practically impossible to arrive at any satisfactory conclusion on the matter. Considering that this plant completed the full power and light load trials without a stop, it is not likely that the stoppage, on the occasion referred to, was due to any defect in the producer, but rather to a want of proper attention to the working of the engine.

There were momentary stoppages on some of the other plants, mainly caused by engine troubles, and cannot be looked upon in a serious light.

With the above-mentioned exceptions, none of the plants experienced any real difficulty in running for the specified period of ten hours—in fact, there is no doubt that they could easily have worked quite well for a much longer time.

The amount of attention which these plants require is remarkably small, very little labour being necessary for cleaning and stoking. Working under ordinary conditions—not a test —it is not considered that it would have been necessary to clean out the ashes and clinker except, perhaps, at the end of each day's run: this, in any case, is a simple operation, which can be performed in a few minutes, and does not require the presence of a special attendant.

All the producers were provided with doors for removing any accumulation of ash and clinker.

On the whole, the results of the trials were most satisfactory, and the economy, efficiency, and simplicity of working of the suction gas-producer plant was demonstrated beyond question.

On the combined trials at full and half load (twenty hours altogether) the average coal consumption for all the plants was about one pound of coal per brake horse-power per hour, costing about one-twentieth of a penny—coal at 9s. 3d. per ton.

This is a remarkable result; it means that an engine developing 20 B.H.P. can be run at a cost of about one penny per hour.

Considering the manifest difficulties in arriving at strictly accurate results, no attempt has been made to place the various plants in any order of merit. For the combined trials the coal consumption for the large engines is practically the same for all plants. The greatest variation is to be seen in the coal consumption of the small plants—0·87 to 1·30 lb. per B.H.P. per hour. This was to be expected.

A rather curious point occurs with regard to the results as obtained from the trials of the Campbell Gas Engine Co.'s plants. The coal consumption per brake horse-power per hour is less on the half load than on the full load trial. This is obviously the opposite from what should be the case, and it may be due to the fact that the fires in the producers in these two plants were not lighted until the morning of the first test, whereas the other plants had their producers in working order the night previously. This would naturally mean that a quantity of fuel was expended in heating up the walls of the producer. It is also possible that a difference in the degree of "clinkering" in the two trials might to some extent account for the discrepancy. No other explanation seems to be available, as all the weights of fuel used were very carefully checked.

It would be unjust to draw any invidious distinctions between the various plants. Without exception they are simple in construction, and every detail both in engine and gas-producing plant has evidently been carefully considered with a view to giving the best results. The Committee feel that they have performed the task which they undertook—viz., of demonstrating publicly the economy and workability of the suction gas-producer plant.

The results of the various trials are given in the following tables:—

TABLE II.—TRIALS OF PLANTS OF ABOUT 20 BRAKE HORSE-POWER CAPACITY.

FULL LOAD TRIAL.

Exhibitor	The Campbell Gas Engine Co., Halifax.	Messrs Crossley Bros., Ltd., Manchester.	The National Gas Engine Co., Ashton-under-Lyne.	Messrs Tangyes Ltd., Birmingham.
Declared B.H.P. at full working load .	18	16	20	19
Duration of trial, hours	10	*8·12*	10	10
Circumference of brake wheel (effective), feet	17·44	14·49	18·46	17·07
Load on brake, lbs.	225·0	197·0	195·0	206·75
Spring balance reading, lbs. . . .	24·0	12·2	4·5	11·60
Effective load on brake, lbs. . . .	201·0	184·8	190·5	195·15
Revolutions per minute, mean . .	192·4	189·2	193·0	197·9
Brake horse-power . . .	**20·44**	**15·35**	**20·57**	**19·98**
Diameter of cylinder, inches . . .	9·5	8·5	10	10
Stroke, inches	18	20	18	19
Mean effective pressure, lbs. per sq. in. .	82·0	73·6	83·7	72·0
Explosions per minute, mean . . .	76·8	86·5	85·4	86·4
Indicated horse-power . .	**23·73**	**18·25**	**25·54**	**23·45**
Mechanical efficiency, per cent	**86·1**	**84·1**	**80·6**	**85·3**
Total coal used, lbs.	190·0	96·5	*105·75	166·0
Coal per B.H.P. per hour, lb. .	**0·93**	**0·77**	**0·80**	**0·83**

HALF LOAD TRIAL.

Exhibitor	The Campbell Gas Engine Co., Halifax.	Messrs Crossley Bros., Ltd., Manchester.	The National Gas Engine Co., Ashton-under-Lyne	Messrs Tangyes, Ltd., Birmingham.
Duration of trial, hours	10	10	10	10
Circumference of brake wheel (effective), feet	17·44	14·49	18·46	17·09
Load on brake, lbs.	127·25	136·75	133·0	106·0
Spring balance reading, lbs. . . .	24·10	32·50	34·5	1·8
Effective load on brake, lbs. . . .	103·15	104·25	98·5	104·2
Revolutions per minute, mean . .	196·1	198·0	190·3	198·7
Brake horse-power	**10·69**	**9·06**	**10·48**	**10·72**
Mean effective pressure, lbs. per sq. in. .	75·6	77·8	80·6	77·0
Explosions per minute, mean . . .	53·1	58·3	51·3	49·7
Indicated horse-power . .	**15·12**	**13·0**	**14·76**	**14·59**
Mechanical efficiency, per cent	**70·7**	**69·7**	**71·0**	**73·5**
Total coal used, lbs.	98·0	87·25	*100·25	116·0
Coal per B.H.P. per hour, lb.	**0·92**	**0·96**	**0·95**	**1·08**
Average coal consumption per B.H.P. per hour on full and half load trials combined, lb.	**0·93**	**0·86**	**0·86**	**0·92**
Capacity of producer, per declared B.H.P., cub. ft.	0·232	0·270	0·295	0·124
Remarks on trials	Completed both trials without a stop.	Did not complete full load trial owing to failure to obtain gas through want of water in the producer; there was a plentiful supply at the main. Load on brake was relieved during half load trial. The speed was somewhat under normal during full load trial.	Completed full load trial without a stop. Stopped for 8 minutes during half load trial, due to carbon deposit on igniting points.	Completed both trials without a stop.

* 10 lbs. and 7 lbs. added to observed consumption for presence of clinker at end of full and half load trials respectively. Total clinker and ash collected at end of the three load trials = 20 lbs.

TABLE III.—TRIALS OF PLANTS OF ABOUT 8 BRAKE HORSE-POWER CAPACITY.

FULL LOAD TRIAL.

Exhibitor	The Campbell Gas Engine Co., Halifax.	The Industrial Engineering Co., Hyde, near Manchester.	The National Gas Engine Co., Ashton-under-Lyne.	Messrs Tangyes, Ltd., Birmingham.
Declared B.H.P. at full working load	8	13·5	8	7·5
Duration of trial, hours	10	10	10	10
Circumference of brake-wheel (effective), feet	13·33	18·57	14·26	15·19
Load on brake, lbs.	98·75	89·3	126·1	95·25
Spring balance reading, lbs.	10·90	5·0	23·5	14·50
Effective load on brake, lbs.	87·85	84·3	102·6	80·75
Revolutions per minute, mean	232·5	204·9	219·8	224·4
Brake horse-power	**8·25**	**9·72**	**9·74**	**8·34**
Diameter of cylinder, inches	7	8·5	7	7
Stroke, inches	12	14	15	16
Mean effective pressure, lbs. per sq. in.	77·8	..	83·8	75·8
Explosions per minute, mean	106·4	..	97·2	92·1
Indicated horse-power	**9·66**	..	**11·88**	**10·86**
Mechanical efficiency, per cent	**85·4**	..	**82·0**	**76·8**
Total coal used, lbs.	100·75	110·25	*82·0	100·5
Coal per B.H.P. per hour, lb.	**1·22**	**1·13**	**0·84**	**1·25**

HALF LOAD TRIAL.

Exhibitor	The Campbell Gas Engine Co.	The Industrial Engineering Co.	The National Gas Engine Co.	Messrs Tangyes, Ltd.
Duration of trial, hours	10	**8·43**	10	10
Circumference of brake-wheel (effective), feet	13·33	18·57	14·26	15·19
Load on brake, lbs.	56·0	37·6	63·0	48·5
Spring balance reading, lbs.	9·7	2·0	7·1	4·1
Effective load on brake, lbs.	46·3	35·6	55·9	44·4
Revolutions per minute, mean	236·8	217·4	222	225·4
Brake horse-power	**4·43**	**4·36**	**5·36**	**4·57**
Mean effective pressure, lbs. per sq. in.	76·2	..	76·3	80·6
Explosions per minute, mean	72·1	..	62·7	59·7
Indicated horse-power	**6·41**	..	**6·97**	**7·49**
Mechanical efficiency, per cent	**69·1**	..	**76·8**	**61·0**
Total coal used, lbs.	41·5	56·75	*49·0	67·5
Coal per B.H.P. per hour, lb.	**0·94**	**1·55**	**0·91**	**1·48**
Average coal consumption per B.H.P. per hour on full and half load trials combined, lb.	**1·12**	**1·26**	**0·87**	**1·30**
Capacity of producer per declared B.H.P., cub. ft.	0·282	0·161	0·372	0·212
Remarks on trials	Completed full load trial without a stop. During the half load trial the load on the brake was relieved for 2 minutes, so that the engine might be stopped for a few seconds to replace a pin on ignition gear.	Completed full load trial without a stop. Did not complete half load trial. Uncertain as to cause of stoppage. This is a larger engine than the one originally entered for the trials.	Completed both trials without a stop. This engine, unlike the rest, was not provided with water tanks, and obtained its cooling water direct from the main.	Load on brake relieved for 9½ minutes on full load trial due to poor gas; engine did not stop. Completed half load trial without a stop.

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* 6 lbs. and 3·5 lbs. added to observed consumption for presence of clinker at end of full and half load trials respectively. Total clinker and ash collected at the end of the three load trials = 12 lbs.

TABLE IV.—TRIAL TO ASCERTAIN THE TIME REQUIRED TO GET UP EACH PLANT TO FULL WORKING LOAD, STARTING WITH THE GAS-PRODUCER EMPTY AND COLD.

Exhibitor.	Declared capacity of plant, B.H.P.	Time taken—minutes.	Remarks.
The Campbell Gas Engine Co. .	18	13	..
Do. do. .	8	17½	..
Messrs Crossley Bros. . . .	24	15½	..
The Industrial Engineering Co. .	10	..	Started, but was compelled to stop through water being shut off at main.
The National Gas Engine Co. .	20	48	Excessive time caused by defective ignition. More than two men were employed to start engine.
Do. do. . .	10	15¾	..
Messrs Tangyes, Ltd. . . .	21	16	..
Do.	12	12½	..

JONATHAN MIDDLETON, *Steward.*
R. STANFIELD, M.Inst. C.E., *Engineer.*

ON SOME INJURIOUS INSECTS IN 1905.

By Dr R. STEWART MACDOUGALL, M.A., Consulting Entomologist to the Society.

CEUTHORHYNCHUS is a genus of weevils, some of whose species are harmful to cruciferous plants.

THE CABBAGE AND TURNIP WEEVIL—*Ceuthorhynchus sulcicollis.*

This weevil measures about ⅛ inch long and is dull black in colour, with greyish scales showing in fresh specimens, and with a projecting snout from which spring bent antennæ. The eggs may be laid on or in the root of cabbage or turnip. The grubs from the eggs are yellowish-white in colour, with brown heads; they are legless, and have a curled, wrinkled body. From their irritating presence galls form on the roots, and inside these the grubs feed and are found. Pupation takes place in the soil, under cover, in a small earthen cocoon. Such cruciferous weeds as charlock act as breeding and feeding places in the early part of the year, and later the turnip is attacked. Infested plants should be removed early, and with the plants the larvæ in the galls will also be removed. The cabbage stocks and removed plants should be burnt, as if merely left to lie or thrown into a heap, the insect can complete its development.

C. assimilis.

A smaller dark-grey species, *Ceuthorhynchus assimilis,* is harmful in the adult stage in the flower-heads of various crucifers—*e.g.*, turnip, mustard, rape; whilst its grubs feed on and destroy the seeds in the pods.

C. contractus.

A third species, *Ceuthorhynchus contractus,* is a troublesome enemy to young plants of turnip and mustard. This beetle is smaller than the two preceding species, measuring up to only $\frac{1}{16}$ inch. The beetle is shining black in colour, and has a slender proboscis; if examined with a lens the front part of its body is seen to be deeply grooved.

There are several records of the harm done by this beetle in the adult condition. Miss Ormerod, in her Report for 1895, quotes a case where young mustard plants checked by frost in the month of April were completely ruined by an onset of these beetles. Attack may be on the leaves above ground, or on the stem above ground, or on the seed leaves just above ground, or the newly sprouted seedling may be attacked and destroyed before the plant reaches the surface. As Mr R. B. Greig has pointed out in the 'Journal of the Board of Agriculture' for April 1905, the seed leaves attacked just as they emerged from the seed show light-brown spots, sometimes ascribed to frost or to the Turnip Fly. Mr Greig, who with Professor Trail has been making a series of observations on this weevil, has found that the insect is kept off if the seed be steeped for an hour or two in paraffin before sowing. From Mr Greig's record of the result of experiments made in 1904 and 1905, kindly sent to me, I quote the following:—

1904.	Length of drill.	Weight of root-tubers.
Paraffin	43 feet.	95 lbs.
Turpentine	〃	97 lbs.
Untreated	〃	75 lbs.

SEED STEEPED FOR FOUR HOURS.

1905.	Length of drill.	No. of root-tubers.	Weight of roots.
Turpentine	33 feet	51	100 lbs.
Untreated	〃	43	85½ lbs.
Paraffin	〃	49	101 lbs.
Untreated	〃	45	90 lbs.

PEA AND BEAN BEETLES.

Several times during the year I had specimens, and complaints of injury to peas by *Bruchus pisi*, and to beans by *Bruchus rufimanus*. In both cases the actual damage is done by the grubs. The adult beetles lay their eggs on the pods when these are young, and the grubs bore into the pea or bean, according to the species of beetle; there they complete their growth, pupating also in the seed. From the peas and beans the adults issue in the spring or earlier, the characteristic small holes showing the place of exit.

Descriptions of the two beetles with their life-history are given in Leaflet No. 150 of the Board of Agriculture, where, under the heading "General Preventive and Remedial Measures," I have written:—

"1. Seed containing the pest should not be sown.

"2. The best mode of killing the pest in the pea or bean is by fumigating with bisulphide of carbon. The method is to enclose the peas or beans to be treated in an air-tight box or chamber, and then to place some bisulphide of carbon in a saucer or saucers or other shallow dishes laid *on the top* of the peas or beans, and allowed to remain for forty-eight hours. If large quantities of peas or beans are being dealt with, 1 lb. of bisulphide of carbon will do for each 100 bushels; or where smaller quantities are to be treated, 1 ounce of bisulphide of carbon for every 100 lb. This treatment is best applied as soon after harvesting as possible, when the temperature is not too low. Bisulphide of carbon fumes are poisonous and easily inflammable; they should therefore not be breathed by the operator, nor should a naked light of any kind be brought near them.

"3. If at the time of sowing live beetles are noticed in the peas, the beetles will be killed if the peas be dipped for five seconds in boiling water. The peas so heated may be sown after being passed through cold water.

"4. If infested peas and beans be placed in a closed jar or other vessel, the beetles will in due course issue and will die without further harming the seeds. The seeds could then, if desired, be sown in the next season, but they cannot be relied upon to produce strong plants."

A CHALCID ENEMY OF DOUGLAS FIR.

During the past year a number of Douglas fir seeds reached me from Aberdeenshire, the seeds being practically ruined by a larva found feeding in them. The adult insect bred out from these seeds proved to be *Megastigmus spermotrophus*, a Chalcid, this being the first record of this insect in Britain. The great majority of the Chalcids are useful insects, inasmuch as their grubs prey upon harmful insects, but certain species of the Megastigmus genus are feeders on vegetable matter. In the United States several species of the Chalcid genus Isosoma are most harmful to cereals, and *Megastigmus spermotrophus* has been introduced originally into our country in Douglas fir seeds from America. I am arranging for some experimental work and for observations on Megastigmus during 1906, and I would be grateful to any members of the Highland and Agricultural Society who, if opportunity offers, would send me infested cones of either Douglas fir or silver fir.

The adult insects are small, the male measuring in length about an ⅛ inch, and the female a little more. The prevailing colour is loam-yellow or orange-yellow. The four wings are somewhat transparent, and the mark of the species is a small branch vein, ending in a club, that is given off from the vein that runs along the front edge of the fore-wing. The female has a long ovipositor, the sheath of which is intense black.

The larva is whitish in colour and legless. It has two brown-coloured chitinised gnawing jaws that are sickle-shaped, and provided with teeth on the concave side.

The adult insect appears with us about May, and lays its eggs in the young Douglas fir cones. Each infested seed contains only one larva, which nourishes itself on the seed contents, quite destroying the seed. When full grown it becomes a pupa in the hollowed-out seed and under cover of the seed coat.

The insects are so small, and the number of cones on the Douglas fir may be so great, that direct measures to prevent egg-laying do not seem very practicable. Exterminative measures should be adopted against the larva in the seed. The cones should be harvested as soon as ripe, and at once subjected to treatment with bisulphide of carbon in an air-tight chamber, one ounce of bisulphide of carbon for every 50 cubic feet of air space. The bisulphide of carbon fumes will kill the larvæ in the seed, and the issue of the next generation of adults will be prevented. Any light seeds blown through by the fan at cleaning time should be burnt.

THE CARROT FLY—*Psila rosæ*.

The Carrot Fly measures ⅕ inch in length and half an inch or so in spread of wings. The wings are iridescent, and have yellowish-brown veins. The body is black or dark green, and the head and legs are yellow.

The maggot is whitish-yellow and legless, and has a pointed head end with two gnawing mouth-hooks; the hind end is blunt, and has two small black spiracular plates.

The puparium or pupa-case is light brown and wrinkled, and at the hind end there are two black spots.

Life-history.—The first brood of flies issues in spring from pupa-cases which have been in the soil during the winter. The adult females lay their eggs a little below the surface of the soil, and the maggots, in hatching from these, pass to the roots into which they bore, especially in the under parts. When full-fed the maggot leaves the carrot, and pupation takes place in the soil. There are several generations in the year.

Preventive and Remedial Measures.

A proved useful measure against the fly is to spray the carrot-bed after sowing with paraffin emulsion, again after germination, and a third time after thinning. Another excellent measure is to mix thoroughly together paraffin and sand in the proportion of 3 gills of paraffin to a bushel of sand. This should be spread between the plants, not broadcasted over them. Attacked plants — recognised by the withering and yellow colour of the leaves—should be pulled early and burned.

On Fig. 26 will be found representations of some insects that are repeatedly complained of.

THE TURNIP FLY OR FLEA BEETLE—*Phyllotreta nemorum.*

The family to which this insect belongs consists of species small in size, and characterised by their powers of leaping, (hence the name "flea" beetles). Several out of the large number of leaping species in Britain have for their chief food-plants the turnip and other crucifers, cultivated and wild. *Phyllotreta nemorum* (No. 1) is a small shining beetle measuring from $\frac{1}{12}$ to $\frac{1}{5}$ inch. It is black, blue-black, or green-black, and with a yellow longitudinal stripe down each wing cover. If the beetle be examined with a hand lens, the antennæ are seen to have eleven joints, the three nearest the head being yellow, the others black. The adult beetles come out of their winter quarters in spring and lay their eggs on charlock and other crucifers till the turnips are ready. The grubs (No. 3) feed internally, mining short galleries in the leaf tissue, and when full grown drop to the ground, pass into the soil, and there pupate. The whole life-history from egg to the adults of the next generation may be passed through in a month; hence there may be several generations in a year. The beetles specially are harmful in their destruction of the seed-leaves (No. 2), but they also feed on the rough leaves of the turnip.

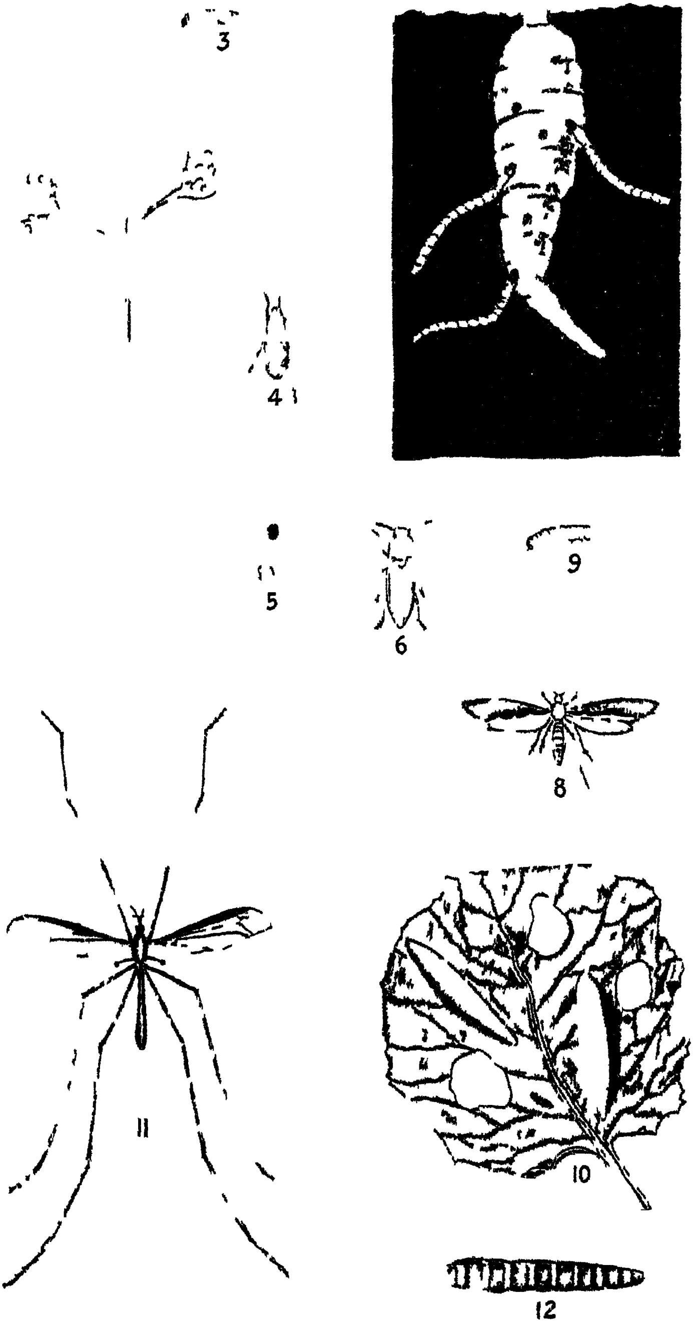

Fig 26 —Insects Injurious in Agriculture (Nos 1 12 .

THE DIAMOND-BACK MOTH—*Plutella maculipennis.*

No. 8 is that of the moth, No. 9 its caterpillar, and No. 10 shows the cocoons on a leaf, all three figures being magnified. The caterpillars of this moth are harmful to cruciferous crops generally. This insect, while not markedly prevalent every year, may now and again, when circumstances favour it, work great havoc. In favourable conditions there are two and more broods in the year.

Apart from the destruction of crucifer weeds, so that the food plants, on which the earliest moths of the year can lay, are lessened, the remedial measures are directed against the caterpillers.

1. To dislodge the caterpillars, drag furze or other branches across the turnips, taking care that the under sides of the leaves are reached, and then follow with the scuffler so as to bury the fallen caterpillars.
2. Dress the plants with a mixture of soot and lime, one part lime to three of soot.
3. Spray with paraffin emulsion.
4. The caterpillars are poisoned if the leafage be sprayed with arsenate of lead made thus:—

One ounce pure arsenate of soda dissolved in a little water.
Three ounces arsenate of lead dissolved in a little water.
Pour both into ten gallons of soft water, adding one lb. of treacle.

THE DADDY-LONGLEGS—*Tipula oleracea.*

The adult and larva of this insect are shown in Nos. 11 and 12. I wrote of this insect in last year's 'Transactions.' As far as report has reached me this year, districts badly infested in 1904 have this year been practically free from the pest.

Fig. 27 contains illustrations of the most important insect enemies in forestry.

THE SMALL BROWN PINE WEEVIL—*Pissodes notatus.*

The beetle (No. 1) measures up to ⅜ inch. The larva (No. 2) is a fleshy legless grub with brown scaly head and gnawing jaws.

The pupa (magnified in No. 3) is found in a bed (No. 4) gnawed out in the youngest wood by the full-fed grub. The beetle appears in the spring, and breeding and egg-laying may take place in all the warmest months. The eggs are laid in punctures made in the bark by the adult female. The grubs tunnel between the wood and the bark. The favourite breeding-places are young pines of various species, from three or four to eight years of age, but trees in the pole stage are also infested. The beetle also breeds in pine cones.

Preventive and Remedial Measures.

1. Root out and remove suppressed and sickly plants.
2. Prepare catch-trees or decoy stems—viz., sickly plants or trees left here and there; or plants may be artificially weakened and left standing; or an older tree may be cut down and allowed to lie. These traps are used by the beetles to lay their eggs in, and they may be allowed to remain for two months, when young trap plants must be removed and burned and older ones barked and the exposed larvæ destroyed.

THE LARGE BROWN PINE WEEVIL—*Hylobius abietis.*

This is one of the very worst enemies of the forester, the harm being done by the adult weevil, which bites away the bark of the stems of young pines, spruce, larch, silver fir, and Douglas fir. The weevil lays its eggs chiefly in the stumps and older roots of felled pine and spruce, and the grubs complete their development by tunnelling below the bark, the beetles, when ready, issuing and making their way to nursery plants and young growth. The beetles have a long life. No. 5 shows the beetle and its work, No. 6 the grub, No. 7 the larval tunnels, and the beds in which pupation takes place.

Preventive and Remedial Measures.

1. Remove stumps and roots of felled trees.
2. Allow these to remain for a time as traps, but grub up and burn so as to destroy the enclosed brood.
3. Avoid cutting and planting areas in regular sequence—*i.e.*, avoid having places for egg-laying and feeding-places side by side.
4. Lay here and there on newly cleared and infested areas pieces of Scots pine bark 8 to 12 in. long by 4 to 6 in. wide, these to lie with their outermost surface uppermost. The beetles collect on the under surface for feeding, and, these traps being visited regularly, many beetles will be caught. These traps must be renewed as they dry.

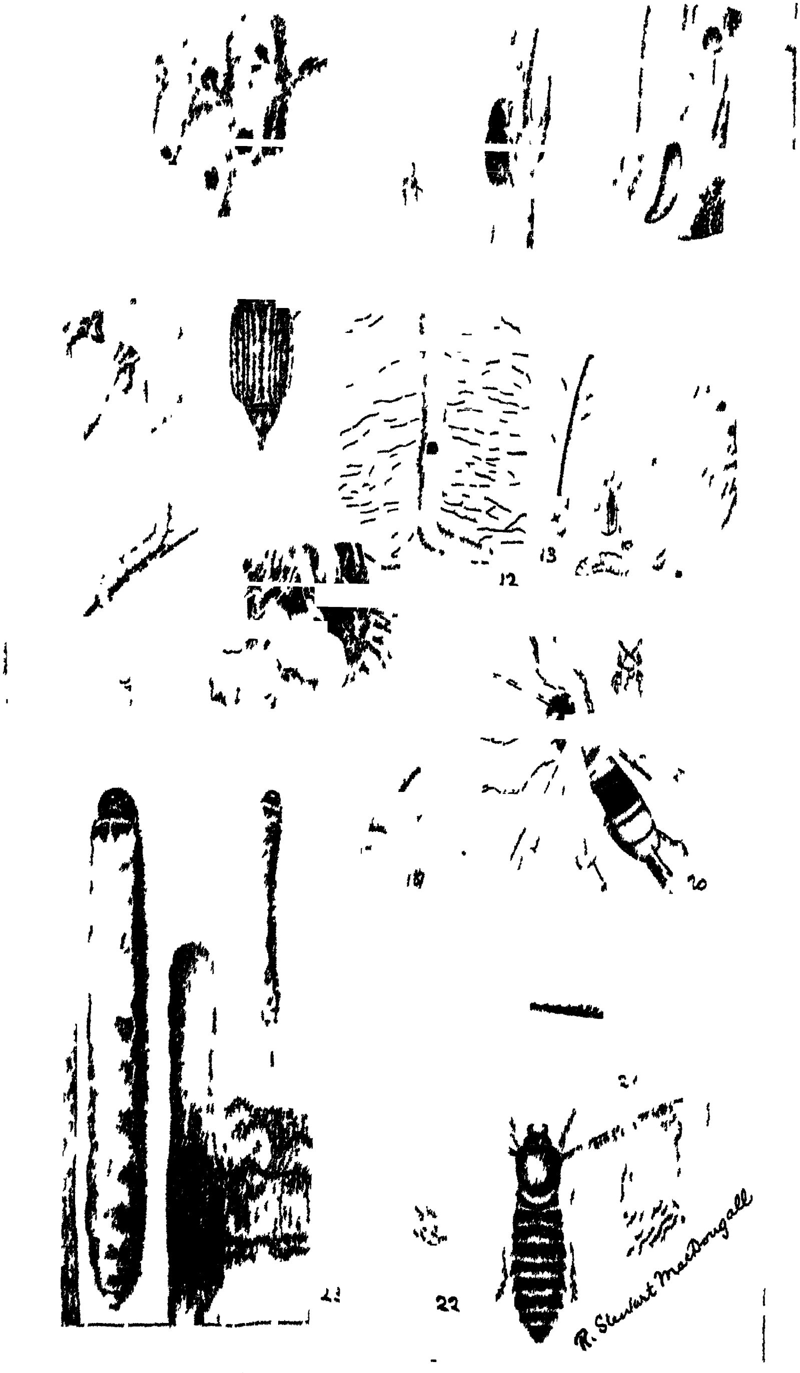

Fig 27 —Forest Insect Enemies (Nos 1 23)

Phyllotreta nemorum is one of a large number of related species, and it is most likely that in Scotland, if careful collection were made and examination followed, it would be found that at least another species of flea beetle was really as harmful or more so. Mr Fred V. Theobald, the Vice-Principal of the Agricultural College of Wye, in an exhaustive paper on flea beetles in his 'Notes on Economic Entomology,' points out as a result of his observations that *Haltica oleracea,* the so-called cabbage flea beetle, is often in England a much more harmful beetle. Mr Theobald further notes this most practical point, that in the genus Phyllotreta the larva feeds internally, and that, therefore, treatment has to be directed chiefly against the adult, whereas in the genus Haltica the eggs are laid on the outside of the food plant and the larvæ on hatching continue to feed externally, so that the Haltica species can be fought in the larval and adult stages.

THE CORN WEEVIL—*Calandra granaria.*

No. 4 is a magnified drawing of this beetle, which in nature measures $\frac{1}{8}$ inch. This beetle was mentioned in my Report last year as very troublesome to stored grain, and also to cargoes of grain in ships. The eggs are laid in the grain, and the larva nourishes itself in the seed; and after the pupal stage the beetle issues by a hole made in the grain, as shown in No. 5. The best measure against this and allied pests is fumigation with bisulphide of carbon. The grain to be treated is placed in an air-tight receptacle, and the bisulphide of carbon having been poured into shallow receptacles, these are laid on the top of the grain. The poisonous fumes kill the insects. The grain treated should be left under treatment for forty-eight hours. Two pounds of bisulphide of carbon are sufficient to fumigate one ton of grain.

Nos. 6 and 7 show one of the click beetles and its grubs—known as wireworms—at work on a carrot. Wireworms are known as perhaps the worst general insect pest the farmer has to contend with. The grubs live for several years, and they feed on all kinds of crops and plants, so that they cannot be fought, as some insects can, by just altering the rotation. Up till now measures that have had for their purpose the killing of the grubs in the soil, and have accomplished this, are too expensive to be recommended as practical measures. Mr G. F. Strawson has written favourably of "vaporite." I hope to have the opportunity of testing this and other insecticides during the summer of 1906, and I would be glad to receive from any members of the Society wireworm grubs, or to hear of any very badly infested ground for experiment.

THE DIAMOND-BACK MOTH—*Plutella maculipennis.*

No. 8 is that of the moth, No. 9 its caterpillar, and No. 10 shows the cocoons on a leaf, all three figures being magnified. The caterpillars of this moth are harmful to cruciferous crops generally. This insect, while not markedly prevalent every year, may now and again, when circumstances favour it, work great havoc. In favourable conditions there are two and more broods in the year.

Apart from the destruction of crucifer weeds, so that the food plants, on which the earliest moths of the year can lay, are lessened, the remedial measures are directed against the caterpillers.

1. To dislodge the caterpillars, drag furze or other branches across the turnips, taking care that the under sides of the leaves are reached, and then follow with the scuffler so as to bury the fallen caterpillars.

2. Dress the plants with a mixture of soot and lime, one part lime to three of soot.

3. Spray with paraffin emulsion.

4. The caterpillars are poisoned if the leafage be sprayed with arsenate of lead made thus:—

One ounce pure arsenate of soda dissolved in a little water.
Three ounces arsenate of lead dissolved in a little water.
Pour both into ten gallons of soft water, adding one lb. of treacle.

THE DADDY-LONGLEGS—*Tipula oleracea.*

The adult and larva of this insect are shown in Nos. 11 and 12. I wrote of this insect in last year's 'Transactions.' As far as report has reached me this year, districts badly infested in 1904 have this year been practically free from the pest.

Fig. 27 contains illustrations of the most important insect enemies in forestry.

THE SMALL BROWN PINE WEEVIL—*Pissodes notatus.*

The beetle (No. 1) measures up to [illegible] inch. The larva (No. 2) is a fleshy legless grub with brown scaly head and gnawing jaws.

The pupa (magnified in No. 3) is found in a bed (No. 4) gnawed out in the youngest wood by the full-fed grub. The beetle appears in the spring, and breeding and egg-laying may take place in all the warmest months. The eggs are laid in punctures made in the bark by the adult female. The grubs tunnel between the wood and the bark. The favourite breeding-places are young pines of various species, from three or four to eight years of age, but trees in the pole stage are also infested. The beetle also breeds in pine cones.

Preventive and Remedial Measures.

1. Root out and remove suppressed and sickly plants.
2. Prepare catch-trees or decoy stems—viz., sickly plants or trees left here and there; or plants may be artificially weakened and left standing; or an older tree may be cut down and allowed to lie. These traps are used by the beetles to lay their eggs in, and they may be allowed to remain for two months, when young trap plants must be removed and burned and older ones barked and the exposed larvæ destroyed.

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This is one of the very worst enemies of the forester, the harm being done by the adult weevil, which bites away the bark of the stems of young pines, spruce, larch, silver fir, and Douglas fir. The weevil lays its eggs chiefly in the stumps and older roots of felled pine and spruce, and the grubs complete their development by tunnelling below the bark, the beetles, when ready, issuing and making their way to nursery plants and young growth. The beetles have a long life. No. 5 shows the beetle and its work, No. 6 the grub, No. 7 the larval tunnels, and the beds in which pupation takes place.

Preventive and Remedial Measures.

1. Remove stumps and roots of felled trees.
2. Allow these to remain for a time as traps, but grub up and burn so as to destroy the enclosed brood.
3. Avoid cutting and planting areas in regular sequence—*i.e.*, avoid having places for egg-laying and feeding-places side by side.
4. Lay here and there on newly cleared and infested areas pieces of Scots pine bark 8 to 12 in. long by 4 to 6 in. wide, these to lie with their outermost surface uppermost. The beetles collect on the under surface for feeding, and, these traps being visited regularly, many beetles will be caught. These traps must be renewed as they dry.

THE COCKCHAFER—*Melolontha vulgaris.*

The adult beetle is shown in No. 8, and the grub and its work in No. 9.

The beetle is harmful in the adult stage to the leafage of trees, and the grub feeds not only at the roots of nursery trees, but also at the roots of agricultural plants, especially on grass lands. The life-cycle requires four years for its completion.

Preventive and Remedial Measures.

1. Plantations of young conifers adjoining grass land should be separated from the latter by a trench to prevent the passage of grubs.
2. Ball-plant with vigorous plants.
3. Collect the grubs during the preparation and working of the soil.
4. Shake the beetles down from trees and collect them.
5. Trap the grubs by laying on the surface of the ground pieces of turf 8 to 12 inches broad, with the grass downwards. The larvæ collect below the traps.
6. On a small scale, sow lettuce and strawberry plants between the rows of young conifers. The grubs attack these in preference to the young trees, and the withering of the plants calls attention to the presence of the grubs.

THE PINE BEETLE—*Hylesinus (Hylurgus) piniperda.*

This insect is destructive, both as adult and as grub, in trees from one hundred years of age downwards. The beetles bore into the bark, and a mother-gallery is made, beginning like the head of a golf-club, and then running longitudinally. Here and there an air-hole is made. Along the sides of this gallery eggs are laid, and the grubs, on hatching, tunnel more or less at right angles to the parent gallery. When full fed they pupate below the bark, and the adults, when ready, issue by biting holes through the bark, which, in bad attacks, may look as if riddled with small shot. The other mode of harm is by the beetles, after issuing from the bark, making their way to the young shoots and boring into them and tunnelling in the pith, so that in a high wind the tunnelled shoots snap off and leave the tree unsightly.

The dark-brown, almost black beetles, are about $\frac{1}{5}$ inch long, and examined with a lens show rows of little tubercles bearing hairs. No. 10 shows the beetle magnified, No. 11 the grub magnified, No. 12 the mother-gallery with air-holes and larval galleries. No. 13 is a tunnelled young shoot cut longitudinally.

Preventive and Remedial Measures.

Remove all thinnings and felled and blown timber as quickly as possible, or else bark such. The barked logs cannot be used by the beetles for boring and egg-laying. A very prevalent source of increase of this beetle is the leaving unbarked, for long periods, blow-downs. Trees felled in autumn or winter can be allowed to remain unbarked till the following May. They will serve as traps in which the Pine Beetle will breed. On the removal of the bark from such traps in May, the enclosed brood can be annihilated. Barking in this case must not be delayed beyond May. Where special traps are arranged, such as sickly trees marked and allowed to remain standing, or felled and allowed to lie as traps, two months may be taken as the time they may remain before the removal of the bark. If the insect be very prevalent a series of such traps should be arranged from March onwards.

THE ASH BARK BEETLE—*Hylesinus fraxini.*

No. 14 is a magnified drawing of this beetle. The beetle measures naturally only about an ⅛ inch. It bores into the bark of ashes of all ages, the mother-gallery being two-armed, and running transversely; the larval galleries run at right angles. Mother and larval galleries are shown in No. 15. The tunnels are in the region of the cambium, between the wood and the bark. I have examples of the work of this beetle on twigs from the thickness of a finger right up to the main trunk of the tree. Measures of prevention and remedy resemble generally those mentioned for *Hylesinus piniperda.*

THE PINE SAW-FLY—*Lophyrus pini* (No. 16).

The caterpillars of this Hymenopterous insect are extremely destructive to the leafage of Scots pine and Austrian pine, and they also gnaw the bark of the young shoots. The caterpillars have 22 legs, and are dirty-green in colour, with brown or black shining heads and dark dots on the body. One of them is shown in No. 17 in a characteristic attitude, with head raised. During their growth they moult, and their moulted skins are found twisted round the shoots and leaves. The pupal stage is passed under cover of a tough cocoon rounded at both ends. The late caterpillars of the year, or the caterpillars of the second brood, may lie for months in the cocoon previous to pupation. The cocoons are found in the ground or attached to the food plant. No. 18 is a drawing life-size of three cocoons found on the bark of a five-year-old pine in one of my recent experiments with this insect. The social caterpillars, feeding it may be many together, eat the needles at their edges; later they eat to the mid rib, and often right down to the dwarf branch as shown in No. 18.

Remedial Measures.

Crush the clumps of caterpillars in gloved hand, or with an instrument for the purpose.

Considerable natural checks aid the forester in the shape of squirrels, mice, birds, and predaceous and parasitic insects. This last summer I bred out from cocoons of *L. pini* both parasitic diptera and parasitic ichneumons. The caterpillars are also sensitive to unfavourable weather, rain, or cold.

THE GIANT WOOD-WASP—*Sirex gigas.*

This handsome insect, the adult female of which is shown life-size in No. 20 and the grub in No. 21, is sent to me every year from different parts of the country. The insect lays its eggs in spruce and silver fir, and sometimes in larch and pine, the eggs being laid singly, in holes bored through the bark and into the sapwood by means of the long ovipositor. The grub tunnels in the wood by means of its powerful jaws. Full grown, the grub pupates just below the outside of the wood, and the adult issues by biting a round hole.

In fighting the wood-wasp sickly trees should be removed to prevent breeding and spreading, and any wounds and barked spots that would be chosen for egg-laying should be covered with some deterrent mixture.

THE GOAT MOTH—*Cossus ligniperda.*

No. 22 is a drawing life-size from nature of a goat moth, and No. 23, also life-size from nature, shows caterpillars in two stages of growth, on a piece of wood tunnelled by the caterpillars. The caterpillars bore galleries in the stems of a number of the softer woods, including fruit trees, and wood badly tunnelled is, on account of the size of the caterpillars, rendered useless for technical purposes. Isolated trees, or those in an avenue or at the edge of a wood, are chosen by the females for their egg-laying in preference to trees in close forest or close growth. The moths fly in June and July, and the eggs are laid in little heaps in cracks and crevices in the bark, generally low down. Pupation takes place in the burrow in the stem, or, on occasion, in the soil, in both cases under cover of a cocoon. The life-cycle is not completed before two years.

Prevention and Remedy.

Prevent egg-laying by smearing or painting over the lower part of the stem up to the height of a man with a mixture of clay and cow-dung, or with a mixture of clay, soft soap, and paraffin. Cut down trees infested with the caterpillars,—recognisable by the excrement thrown out of the burrows by the feeding caterpillars and by the goat-like odour given off by the caterpillars,—and destroy the brood.

MILK RECORDS.

THIRD SEASON—Giving the yield in Milk and Butter-fat of 815 Cows.

By JOHN SPEIR, Newton, Glasgow.

IN the Report for 1904 a summary was given of the great gain which had resulted to several milk record associations in Denmark from the adoption of the co-operative system of testing cows every 14 days or so. That summary showed great increases in the milk and butter yields of the cows, and I hoped ere this to have been in a position to have laid before the farmers of Scotland an exact statement of the increases which had been obtained in 10 years by the oldest of these societies. I have not been able to do so, but have succeeded in preparing summaries of the increases obtained in other countries where the system has been adopted. It is now eleven years since the first society was instituted in Denmark, and since then the number has increased to something like 400. They are very popular in Denmark, and farmers there consider that their adoption has enabled them to produce a much greater quantity of either milk or butter from a given quantity of food or area of ground than they could have done by any other means. Personally, I consider Ayrshire cows superior to those of Denmark, but the general usefulness of the Scotch breed as milk producers is very much reduced by the large proportion of unprofitable cows among them. The main aim of this scheme is to reduce these, as there is abundant evidence to prove that two cows may get exactly the same food and yet the one may produce 50 per cent more milk or butter than the other. The one which produces least may barely yield sufficient to pay for its food, while the other may yield a handsome profit.

Sweden has in working order something over 200 milk record societies, a large proportion of which are in the south-west part of the country, opposite Copenhagen. The following table, from the 'Journal of the Board of Agriculture' for January 1906, shows the extent of work done in that district by the Malmo Union, comprising 82 societies, during the past four years:—

Year.	No. of members	Average number of cows	Average yield per cow		
			Milk in lb	Butter-fat in lb	Per cent of fat
1901-2	227	10,960	3134	101	3·21
1902-3	311	16,207	3424	111	3·25
1903-4	626	22,337	3484	113	3·25
1904-5	860	27,362	3539	115	3·24

Over the whole union of societies the increase in four years is 13 per cent. It will be noticed that this is the result of extra milk yielded, and not extra fat in the milk, as the latter has remained practically stationary. This is the common, although not the invariable result, as will be shown further on, and with the Ayrshire there seems good reason for believing that, with due care in selection and breeding, not only the milk-producing but also the butter-producing powers of our cows could be very much increased at almost no extra cost for food. In the south of Sweden the Vallakra Society has been in existence for six years, and during that period the average increase per cow has been 31 per cent, or an average increase of over 5 per cent per annum. This society has not only increased its yield of milk per cow from 670 gallons to 876 gallons per year, but it has increased the fat in the milk from 3·09 to 3·21 per cent during the same period.

Within the last few years a large number of milk record societies have been started in Norway, and my friend Mr Johan E. Mellbye, the late Minister of Agriculture, has furnished me with a very complete record of the work of his local society. In Denmark, Sweden, and Norway all the milk record societies keep a very complete account of the food used by each herd, every article of which has been given an agreed on fixed price. This is for the purpose of showing the cost for food requisite to produce 1 gallon of milk or 1 lb. of butter. In every one of these countries, and elsewhere, all experience indicates that the heavier milking cows produce both milk and butter very much cheaper per gallon or per lb. than those giving a smaller yield. In all these countries the gain obtained in this respect has been most marked, and as the results may interest many people in Scotland, I have gone to the trouble of calculating out those of the Gaupen Society into British weights and money. Like most of the others, this society consists of 12 farms, and for these the average cost for food, at the prices agreed on, was as follows per lb. of butter produced:—

Year.	Cost of food per lb. of butter.
1901	8d. per lb.
1902	6·6d. "
1903	4·75d. "

After paying for the food at the prices agreed on, the amount available per cow to meet other expenses and profit was as follows:—

Year.	Surplus per cow after paying cost of food.
1901	43s. 8d.
1902	71s. 9d.
1903	103s. 10d.

The same method of testing cows has been practised for several years in Holland, and as showing how the butter-producing capabilities of a herd may be built up by selection alone, one instance of an ordinary farm in that country may be mentioned. Mr Kuperus, at Marsum, keeps a herd of 35 cows, and since 1897 it has been tested every 14 days, with the following result:—

Year.	Average per cent of fat in the milk.
1897	3·15
1898	3·28
	3·39
1900	3·46
1901	3·47
1902	3·44
1903	3·50
1904	3·52

As is well known, Dutch cows generally yield milk of a very much lower percentage of fat than Ayrshires, and this is clearly indicated in the quality of the milk yielded during the year when testing began. Since then it has gradually but steadily increased, until after 8 years testing the quality is almost equal to that of an ordinary Ayrshire herd. On this farm one cow has yielded as much as 1865 gallons of milk in 329 days, while the highest yield of butter by a single cow has been 615 lb. in 317 days. The latter is, of course, only a calculation from the amount of butter-fat in the milk for the period referred to, after making the ordinary allowances for loss and water in the butter, as the cow's milk was not separately churned.

All these increases in the various countries named have been obtained by exactly the same methods as those which we are adopting here—viz., weighing and estimating the fat in the milk every 14 days by an independent expert. I am well acquainted with the cows of all these countries, and I think that in the Ayrshire we have a better animal than any of them, if the unprofitable ones were only eliminated. The Dutch cow probably gives fully as much milk as the Ayrshire, but the fat is about ·5 per cent less. Much the same applies to the Danish cow, while only a few of them are equal to the Ayrshire as milkers. In the south of Sweden, and also in the south of Norway, a large proportion of the cows are of Ayrshire extraction. Leaving out of account the enormous benefit our farmers might obtain by eliminating the poor milking strains, and breeding only from the good ones, there is still a big market in these countries for suitable surplus stock. The Swedish people are great believers in the Ayrshire cow, and for several years they have insisted on knowing the milk yield of the parents of the stock they bought. In the future they will do this more than they have done in the past, and are likely to be the first to take advantage of the milk records for this purpose. They will not, however, be satisfied with a test of seven or eight months, but will prefer it for the whole period of lactation, and those organising milk record societies would do well to consider their wishes in this respect. While a test extending for nine or ten months serves almost every purpose in a cheese-making district, in all others an attempt should be made to carry it on all through the year. This is much the most satisfactory method, and any other should only be adopted in isolated cases.

The Work in Scotland in 1905.

During the year 1905 two associations have carried out the milk record scheme of this Society and have received grants towards the work. The Fenwick Society began at the New Year and has gone on continuously since. The cows in this district are used almost entirely for the production of milk for consumption as such in Glasgow, and milk is therefore produced during the whole year. With the exception of the grant from the Highland and Agricultural Society, the members have met the whole of the other expenses themselves. The work done by this association is by far the most satisfactory that has yet been attempted under the auspices of the Highland and Agricultural Society. With one exception it is almost complete in every particular, that one exception being the interval between the testings. These are made only every 21 days, whereas in all the other cases the expert visits each farm every 14 days. A test every 21 days is not so reliable as one every 14 days.

The following is a list of the members of the Fenwick Milk Record Association, the expert in charge being William G. M'Leary:—

Mrs Mather, Thorn, Fenwick.
William Wilson, High Todhill, Fenwick.
John Lindsay, Moss-side, Fenwick.
James Howie, Hillhouse, Kilmarnock.
James Garven, Dalmusternock, Fenwick.
James Young, Marchbank, Fenwick.
D. & J. Bicket, Raithmuir, Fenwick.
John Douglas, Langdyke, Fenwick.
James Young, Hareshaw, Fenwick.
A. B. Paton, Collarie, Fenwick.
James Lindsay, Blackbyre, Fenwick.
James Dunlop, Midland, Fenwick.
John Smith, Wylieland, Fenwick.
John Gemmill, Aitkenhead, Fenwick.
Robert Loudon, Harelaw, Fenwick.
James Dunlop, Gree, Fenwick.
David Murchland, Broadmoss, Fenwick.
Andrew Clement, Netherton, Newton Mearns.

The herds embraced in the Fenwick Milk Record Association had the following numbers of cows reported on, and, including two- and three-year-old heifers, gave the following averages for the whole herd in gallons of milk of 3 per cent of fat for the whole year:—

Letter representing the farm	No of cows reported on.	Average yield of the whole herd in gallons of milk of 3 per cent of fat	Average weeks in milk
A	22	699½	$40\frac{1}{7}$
B	26	989	$42\frac{3}{7}$
C	27	1075	$42\frac{4}{7}$
D	13	917	$42\frac{2}{7}$
E	21	895	$42\frac{6}{7}$
F	14	1103½	45
G	13	737½	$40\frac{1}{7}$
H	32	1084	$45\frac{4}{7}$
I	32	758	$41\frac{5}{7}$
J	28	813⅔	40
K	31	821½	$40\frac{5}{7}$
L	28	906	$42\frac{4}{7}$
M	29	948	$45\frac{1}{7}$
N	24	805½	41
O	23	655	$37\frac{2}{7}$
R	22	791½	$38\frac{4}{7}$
S	26	878	$41\frac{2}{7}$
T	32	844	$41\frac{4}{7}$
Total,	443	True average per cow 875 galls. of milk of 3 ,, of fat.	

The Fenwick Milk Record Association having been carried on for a full year, gives an opportunity of finding any really exceptional cows that are in the district, which has not hitherto been the case. Several exceptional animals have been brought to light, and what is of more importance, several very good stocks. In the association nine animals have produced over £30 of milk within the year, valuing the milk at 5d. per gallon for milk of 3 per cent of fat. According to situation and markets this price may or may not be the correct value of the milk, but as it has been the basis of all the calculations for the previous years, it has been adopted for this one also.

PARTICULARS OF THE HEAVIEST MILKING COWS IN THE FENWICK MILK RECORD ASSOCIATION.

	No. of cow.	Total milk in galls.	Average milk per day in lb.	Average per cent of fat.	Total milk of 3% of fat in galls.	Value of the produce at 5d. per gall. £	s.	d.	Age of cow.	Size of cow.	Dates of calving.	
H	30	1312		3.80	1679	34	19	7	6	L	Nov. 25 " 14	48
C	25	1186		3·90	1554	32	7	6	10	M	Feb. 6	45
C	26	1305		3·50	1533	31	18	9	4	L	March 19	45
A	27	886		5.10	1523	31	14	7	3	M	Nov. 20 " 7	48
C	22	1135		4.00	1518	31	12	6	11	L	Feb. 10	45
C	23	1151		3.90	1488	31	0	0	10		Feb. 8	42
H	6	1073		4·12	1473	30	13	9	7	M	Aug. 30 " 14	48
C	8	1043		4·10	1443	30	1	3	3		" 20 Dec. 3*	54†

* Calved six weeks too early.

† Several cows in this and other tables are stated as having given milk for 54 weeks. In order to complete the year a certain number of visits were necessary, which, multiplied by 21 days, give 54 weeks for those cows which had been in milk all the time. A deduction ought to have been made to bring these down to 52 weeks, but as the books had already been checked by the accountant, it was considered advisable to allow his figures to remain.

Out of a total of 443 cows among the members of the association, the following yields were obtained:—

No. of cows.		Per cent of cows [illegible] the members of the association.		Total value of the milk at 5d. per gallon for milk of 3% fat
9	*equal to*	2 per cent	*yielded*	£30 of milk or over.
37	"	8 "	"	£25 " "
137	"	31 "	"	£20 " "

Belonging to the members of the association there were 97 three-year-old heifers, and of these 18, equal to 18·5 per cent of the whole, yielded within the year milk of a total value of £20 or over, as per following table:—

Farm.	No. of cow.	Total milk in galls.	Average milk per day in lb.	Average per cent of fat.	Total milk of 3 °/ₒ of fat in galls.	Value of the produce at 5d. per gall. for 3 °/ₒ milk.			Size of heifer.	Dates of calving.	Weeks in milk.
						£	s.	d.			
A	27	886	26·3	5·10	1523	31	14	7	M	Nov. 20, 1904 " 7, 1905	48
C	8	1043	27·5	4·10	1443	30	1	3	L	Aug. 20, 1904 Dec. 3, 1905*	54
S	22	878	27·8	4·20	1233	25	13	9	M	Oct. 20, 1904 " 20, 1905	45
H	12	934	27·7	3·80	1198	24	19	2	M	Nov. 11, 1904 Oct. 26, 1905	48
K	22	728	19·2	4·79	1168	24	6	8	M	Nov. 1, 1904	54
F	15	817	24·3	4·20	1160	24	3	4	M	" 17, 1904	48
B	22	790	25·1	4·29	1103	22	19	7	M	Sept. 18, 1904 " 1, 1905	45
T	21	834	24·6	3·80	1088	22	13	4	L	Feb. 10, 1905	51
E	20	909	24·0	3·50	1065	22	3	9	L	Dec. 11, 1904	54
B	18	819	27·0	3·70	1035	21	11	3	M	Nov. 4, 1904 " 7, 1905	45
F	14	827	26·2	3·60	1016	21	3	4	M	Jan. 11, 1904 Dec. 11, 1905	45
R	7	817	25·9	3·70	1012	21	1	8	S	Sept. 20, 1904 Nov. 10, 1905	45
M	27	775	20·5	3·90	1009	21	0	5	M	Dec. 6, 1904 Nov. 10, 1905*	54
M	22	741	19·6	4·20	1008	21	0	0	M	" 1, 1904 " 10, 1905*	54
H	9	864	25·7	3·50	1007	20	19	7	L	Sept. 23, 1904 Aug. 17, 1905	48
H	34	757	19·5	4·00	989	20	12	1	S	Oct. 12, 1904	54
B	17	813	27·6	3·50	972	20	5	0	L	Nov. 7, 1904 " 1, 1905	42
M	23	786	23·3	3·69	968	20	3	4	M	" 1, 1904 Oct. 9, 1905	48

* Calved before the natural time.

Several of the above heifers have their milk yield unnaturally raised owing to having calved prematurely, and properly speaking a yield so obtained is not comparable with one produced under ordinary conditions. In a few other instances the yield is spread over fifty-four weeks, which is also unnatural, and has been brought about by the failure of those in charge to get the cow in calf. Notwithstanding these reservations, the list of heifers is a particularly good one, and it will be interesting to observe how these animals behave in future years. The number and the yield are both greater than I thought it possible to get in any district, and they form a superstructure on which to build some very good milk records for the future.

It may never be possible to have all the cows of a herd raised to the level of 10 per cent of the best at present, but there surely should be no difficulty in bringing the heaviest and lowest milkers nearer each other than they are on the most of farms at present. The worst cows of some of the stocks are almost as good as some of the best of others, while between the average of 44 of the best and an equal number of the worst, there is a difference in value of the produce of £10, 5s. 5d. If those giving the lowest amount should only pay expenses, there must be a very good profit from the best milkers. It

AVERAGE YIELD OF 10 PER CENT OF THE HEAVIEST AND LIGHTEST MILKING COWS OF EACH HERD, EXCLUDING HEIFERS.

Farm.	No. of cows in each herd.	No. reported on.	Total milk in gallons.	Average per cent of fat.	Total milk of 3% of fat in gallons.	Value of the produce at 5d. per gallon.		Average No. of weeks in milk.
						Heaviest milkers.	Lightest milkers.	
						£ s. d.	£ s. d.	
A	22	2	833	4·57	1271	26 9 7	...	43½
		2	468	3·83	596	...	12 8 4	34½
B	26	3	980	3·76	1231	25 12 11	...	45
		3	739	3·38	833	..	17 7 1	40
C	27	3	1209	3·81	1535	31 19 7	...	45
		3	552	3·65	667	...	13 17 11	38
D	13	1	815	4·40	1207	25 2 11	...	39
		1	583	4·18	809	...	16 17 1	36
E	21	2	972	3·47	1123	23 7 11	..	46½
		2	653	3·42	747	...	15 11 3	39
F	14	1	1108	3·70	1394	29 0 10	...	51
		1	663	3·80	858	...	17 17 6	39
G	13	1	770	3·90	1006	20 19 2	...	45
		1	534	3·40	620	...	12 18 4	36
H	32	3	1193	3·84	1528	31 16 8	...	49
		3	497	3·71	615	...	12 16 3	43
I	32	3	825	3·72	1023	21 6 3	...	46
		3	569	3·45	654	...	13 12 6	39
J	28	3	636	4·28	946	19 14 2	...	44
		3	591	3·42	686	...	14 5 10	32
K	31	3	868	4·40	1168	24 6 8	...	44
		3	547	3·62	660	...	13 15 0	37
L	28	3	1044	3·52	1226	25 10 10	...	48
		3	535	3·72	663	...	13 16 3	38
M	29	3	963	3·74	1202	25 0 10	.	46
		3	623	3·66	762	..	15 17 6	42
N	24	3	809	3·62	978	20 7 6	..	41
		3	574	3·65	699	...	14 11 3	35
O	23	2	676	3·94	887	18 9 7	..	40½
		2	391	3·51	458	...	9 10 10	36
R	22	2	979	3·52	1150	23 19 2	..	45
		2	501	3·68	616	...	12 16 8	28½
S	26	3	855	4·21	1268	26 8 4	..	42
		3	653	3·35	716	...	14 18 4	38
T	32	3	940	3·56	1116	23 5 0	...	32
		3	467	3·50	544	...	11 6 8	32
Total	443	44 44	...	...	...	...	...	...
Average of the best .			915	3·89	1170	24 7 6	...	42⁵⁄₇
" " lowest			563	3·61	677	...	14 2 1	36⁶⁄₇
Difference. . .			...	...	...	...	10 5 5	5⁶⁄₇

seems to me that judicious selection of heavy milking cows offers at the present time by far the best chance of success in dairying. What is more, it is not obtained at the expense of any one else, nor by offering a competitive rent against any other person, nor by underselling them in any market. It is a pure saving of what is at present running to waste, and all that is necessary to obtain it, is the expense of testing and rigid elimination of unsatisfactory cows whenever they are found. As far as is known at present, testing in the manner carried out by this society is the only practicable method yet suggested which enables the ordinary breeder to do this.

Hitherto attention has solely been directed to the particularly good animals in each herd, but while these have been numerous there are among them many cows which have been anything but profitable to their owners. The finding out of these is one of the main objects of this work, and as was to be expected some have been discovered, but the number is not so great as in some previous years. Among the cows the following may be drawn attention to as unworthy of being longer retained for dairy purposes:—

Farm.	No. of cow.	Total milk in galls.	Average milk per day in lb.	Average per cent of fat.	Total milk of 3 °/. of fat in galls.	Value of the produce at 5d. per gall for milk of 3 °/. fat.	Age of cow.	Size of cow.	Dates of calving.	Weeks in milk.
						£ s. d.				
O	18	301	13·0	3·70	379	7 19 4	5	M	April 26	33
T	35	403	19·2	3·60	494	10 5 10	6	S	May 1	30
T	12	508	18·5	3·20	546	11 2 6	5	M	March 8	39

There are a considerable number of three-year-old heifers that seem as if they would make indifferent cows. Among them the following may be referred to as animals which have either given a very small quantity of milk, or have milked for a very limited period.

TABLE SHOWING EIGHT OF THE LEAST PROFITABLE HEIFERS.

Farm.	No. of cow.	Total milk in galls.	Average milk per day in lb.	Average per cent of fat.	Total milk of 3 °/. of fat in galls.	Value of the produce at 5d. per gall.	Size of cow.	Dates of calving.	Weeks in milk.
						£ s. d.			
T	33	462	20·0	3·50	547	11 2 11	S	Jan. 12	33
G	9	381	15·1	3·90	503	10 9 7	S	April 10	36
I	2	475	18·3	3·10	494	10 5 10	S	May 10	36
R	23	429	20·4	3·40	493	10 5 5	S	June 10	30
A	22	319	19·0	4·30	459	9 11 3	M	May 25	24
K	14	349	15·1	3·70	431	8 19 7	M	" 30	33
O	11	322	15·3	3·90	422	8 15 10	S	April 1	30
K	12	417	16·5	2·90	415	8 12 11	M	May 10	36

While some of the two-year-old heifers have given a good return, others are very unprofitable animals.

TABLE SHOWING SOME OF THE LEAST PROFITABLE OF THE TWO-YEAR-OLD HEIFERS

Farm.	No of cow	Total milk in galls	Average milk per day in lb	Average per cent of fat	Total milk of 3° of fat in galls.	Value of the produce at 5d per gall. £ s. d.	Size of cow	Dates of calving	Weeks in milk.
O	12	190	10·0	3 60	228	4 15 0	S	April 3	27
I	34	364	17 3	3·10	382	7 19 2	M	June 20	30
I	28	427	16 9	3·30	477	9 18 9	S	May 5	36
I	33	425	18·3	3·80	537	11 3 9	S	June 1	33

The Effect of Age on the Yield of Milk.

Opportunity has been taken of the milk records of this association to find out the effect of age on the quantity and quality of milk yielded by animals of different ages. In previous years this was done for the length of time the test lasted, but while these figures were of some value as far as they went, the period over which the test extended was too short to give reliable information on the matter. The number of cows available in one year is also too limited to be reliable, but the experience of other years can be added to this, and the information will gradually grow, and the figures will yearly become more steady.

TABLE SHOWING THE YIELD OF AYRSHIRE COWS OF DIFFERENT AGES.

Age of the cows in years	No of animals reported on.	Average milk in galls	Average per cent of fat.	Average milk of 3 per cent of fat in galls
2	7	591	3·77	717
3	86	642	3·84	822
4	69	708	3·69	871
5	47	748	3·66	912
6	53	794	3·58	947
7	43	794	3·62	958
8	26	769	3·53	905
9	12	831	3·65	1011
10	22	820	3·55	970
11	7	894	3·64	1085
12	3	734	3·80	930
15	2	801	3·75	1001
16	1	624	3·50	728
20	1	878	3·70	1083
Total .	379	...	...	...

This table has been compiled from the record only of such animals as were producing milk under normal conditions and had calved at the proper time.

THE CUMNOCK MILK RECORD ASSOCIATION.

This association is under the auspices of the Ayrshire Agricultural Association, which pays the portion of the expense which is not met by the grant from the Highland and Agricultural Society. The only expense, therefore, that the members are put to is that of boarding the expert and conveying him and his outfit from farm to farm. This is so trifling that there is no excuse on the score of expense for delaying the date at which a beginning should be made, even although there should be only a few cows in milk at each farm, as the number increases so quickly very soon after. The benefit of having a full record of each cow is so great compared with a partial one, that it is always to be preferred. Where new societies are instituted they usually allow too much of the winter to elapse before their arrangements are completed, in the belief that as soon as they have everything arranged they will be able to begin work at once. This, however, is not the case, for before an expert can be engaged and everything ready, a few weeks are often lost. This was the case with the Cumnock Society.

This association began on 1st April. Each farm was visited once every 14 days. In a cheese-making district all the cows are wanted to calve as near one time as possible. It was late in the season before it was decided to form an association, and after such was done some little time elapsed before a beginning could be made. Quite a sufficient number of cows were in milk in March to have allowed a beginning to be made then, had arrangements permitted of this. The testing was continued for 34 weeks, but in order to give the full yield of the cows, the testing should be continued over a period of from 40 to 44 weeks. In a district such as this testing during a portion of the year suits quite well enough, and serves all the purposes for which the scheme was intended. The period of testing should, however, embrace a period longer than that of the average period of lactation of the cows, so as to begin with the earliest calved ones, and be continued till the last ones cease to give any milk. Unless this is done breeders put their cows in a very false position in regard to their capabilities, and from this point of view alone a little extra expense in beginning early and continuing late will not be money thrown away. The following are members of the Cumnock Milk Record Association:—

James Sloan, Dormiston, Ochiltree.
Robert Steele, M'Quittiston, Ochiltree.

Adam W. Montgomerie, Lessnessock, Ochiltree.
Messrs Wilson, Auchencloich, Ochiltree.
D. Wardrop, Knockterra, Cumnock.
D. Stevenson, Changue, Cumnock.
W. M'Lanachan, Loganhill, Cumnock.
W. M'Lanachan, Borland, Cumnock.
A. Arthur, Benston, New Cumnock.
John Sloan, Creoch, New Cumnock.
A. M. Baird, Garclaugh, New Cumnock.
John Lennox, Auchengee, New Cumnock.

The herds embraced in the Cumnock Milk Record Association had the following number of cows reported on, and, including two- and three-year-old heifers, gave the following averages for the whole herd, in gallons of milk of 3 per cent of fat, for a period of 34 weeks.

Letter representing the Farm.	No. of cows reported on.	Average per cent of fat.	Average yield of the whole herd in gallons of milk of 3 per cent of fat.
A	45	3·80	547⅓
B	41	3·74	689⅓
C	38	3·69	586
D	36	3·78	572½
E	40	3·87	669¼
F	24	3·72	677⅓
G	30	3·94	909½
H	26	3·59	571¼
I	20	3·74	589
J	25	3·90	642⅓
K	23	4·00	691⅔
L	24	3·95	591
Total .	372		

COWS IN THE CUMNOCK DISTRICT WHICH IN THIRTY-FOUR WEEKS HAVE YIELDED OVER £20 OF MILK, AT 5D. PER GALLON, FOR 3 PER CENT FAT.

Farm.	No. of cow.	Total milk in galls.	Average milk per day in lb.	Average per cent of fat.	Total milk of 3 % of fat in galls.	Value of the produce at 5d per gall.	Age of cow.	Size of cow	Date of last calving.	REMARKS
						£ s. d.				
G	26	884	39·4	4·20	1267	26 7 11	5	M	April 21	
G	19	761	31·9	4·30	1115	23 4 7	5	M	Feb. 28	
G	12	780	37·1	3·80	1076	22 8 4	5	M	May 5	
G	21	902	37·9	3·50	1064	22 3 4	10	L	Feb. 19	
G	8	757	36·0	3·70	1009	21 0 5	9	M	April 29	
G	9	794	33·3	3·80	1005	20 18 9	8	L	March 24	
G	5	658	27·6	4·50	1004	20 18 4	4	M	„ 5	
G	14	818	34·3	3·60	1003	20 17 11	6	M	„ 19	
G	24	802	33·7	3·70	1003	20 17 11	10	M	Feb. 8	
G	13	811	38·6	3·30	987	20 11 3	8	L	May 10	
G	30	734	30·8	4·00	984	20 10 0	4	S	Jan. 6	

* Have had two or more weeks added to their actual yield, at the rate of decrease for the previous month, in order to show their probable yield for 34 weeks.

THE TWELVE HEAVIEST MILKING HEIFERS.

Farm.	No. of cow.	Total milk in galls.	Average milk per day in lb.	Average per cent of fat.	Total milk of 3 % of fat in galls.	Value of the produce at 5d. per gall.			Age of cow.	Size of cow.	Date of last calving.	REMARKS.
						£	s.	d.				
G	17	566	23·7	4·10	785	16	7	1	3	S	Dec. 24	*
E	28	530	22·3	4·33	767	15	19	7	3	L	April 3	...
B	23	569	23·9	3·90	732	15	5	0	3	M	March 4	...
K	6	505	21·2	4·20	709	14	15	5	3	M	Dec. 31	...
B	40	555	23·3	3·80	705	14	13	9	3	M	March 9	...
E	19	526	23·5	3·90	704	14	13	4	3	S	April 19	*
D	11	456	21·7	4·10	703	14	12	11	3	M	May 4	*
K	13	528	22·1	3·86	679	14	2	11	3	M	Feb. 11	...
E	2	500	21·0	4·01	672	14	0	0	3	L	" 9	...
K	16	474	19·9	4·20	670	14	1	8	3	L	" 11	...
K	18	476	26·1	4·20	669	14	1	3	3	L	Nov. 12	26 weeks
L	23	528	22·2	3·70	664	13	16	8	3	M	Feb. 3	...

* Have had two or more weeks added to their actual yield, at the rate of decrease for the previous month, in order to show their probable yield for 34 weeks.

If heifer K 18 were credited with the milk of other eight weeks at the beginning of her period of lactation, at the same rate as she was yielding during April, she would have produced something like 203 gallons of 3 per cent milk during that period. If this is added to what she did produce during the twenty-six weeks she was under observation—viz., 669 gallons—it gives a total of 872 gallons of 3 per cent milk as about her probable yield in thirty-four weeks. Had this been absolutely proved, it would have made her much the best heifer in the lot. Much the same remarks apply to another heifer in this herd—viz., K 19. She was only under observation for twenty-six weeks also; her yield during that period was 609 gallons, and if her yield is made up to what it might have been during thirty-four weeks, on the same basis as the other, 172 gallons require to be added, making her total 781 gallons of 3 per cent milk for thirty-four weeks. The heifer G 17, first on the list, is a really remarkable animal. She was calved thirteen weeks before testing began, and went dry two weeks before it finished. She is credited with two weeks' milk similar to what it was early in April, and during her whole lactation she must have produced a large quantity of milk.

The following are instances of the least profitable cows in the Cumnock Milk Record Association. Most of them are of an age which should have permitted of their elimination before this, but their existence in a breeder's herd is only another indication of the necessity for systematic testing, such in fact as can only be carried out by a scheme such as this.

Farm.	No of cow.	Total milk in galls	Average milk per day in lb	Average per cent of fat	Total milk of 3 % of fat in galls	Value of the produce at 5d. per gall. £	s.	d	Age of cow	Size of cow	Date of calving	Weeks in milk.
A	5	328	15·6	3·30	362	7	10	10	4	M	April 2	30
A	23	363	20·0	3·16	384	8	0	0	6	M	" 13	26
J	9	315	18·7	3·80	401	8	7	1	6	L	March 6	24
J	1	306	24·3	4·10	423	8	16	3	8	L	Feb. 2	18

Cows more or less similar to the above exist in many herds, and nothing but continuous attention and persistent weeding will get rid of them.

The following are a few of the least profitable heifers in this district, which, considering the large number reported on, is very small:—

Farm.	No. of cow.	Total milk in galls.	Average milk per day in lb.	Average per cent of fat.	Total milk of 3 % of fat in galls.	Value of the produce at 5d. per gall. £	s.	d.	Size of cow.	Date of calving.	Weeks in milk.
C	8	211	15·0	3·90	307	6	7	11	L	April 16	22
D	24	275	15·1	3·80	352	7	6	8	L	May 19	26
A	21	272	16·2	3·66	358	7	9	2	S	April 6	24
I	19	350	20·8	3·80	448	9	6	8	L	" 16	24

The Effect of Length of Lactation on the Yield of Milk.

If reference is made to the Table on p. 244, where the average period of lactation of each stock is compared with the total milk yield of that herd, it will at once be noticed that the average of each very closely corresponds with the other. In some of the stocks the average period of lactation is slightly shortened owing to the numbers of heifers in the herd. After allowance has been made for that it will be found that the relationship of the ability to continue long in milk is closely connected with the capability to yield a large quantity. Both are undoubtedly inherited qualities, equally as much as that of giving milk of a high or low percentage of fat, and have little to do with the food supply. In Sweden it is a common belief that the Ayrshire does not milk so long as some other breeds. This may be quite correct for the families or individuals sent to Sweden, and an endeavour should be made to show whether

Average Quantity and Quality of Milk Yielded by Cows of Different Ages in the Cumnock Milk Record Society during Thirty-Four Weeks in 1905.

Age of cows	No. of cows reported on.	Total milk yielded in 34 weeks in gallons.	Average per cent of fat.	Total milk of 3% of fat in 34 weeks in gallons.
2	2	490	3·80	621
3	53	438	3·86	563
4	52	514	3·73	639
5	42	555	3·72	688
6	43	568	3·63	687
7	25	581	3·62	701
8	22	623	3·61	740
9	10	614	3·55	730
10	17	629	3·73	782
11	7	607	3·62	732
12	4	565	3·74	688
13	1	571	4·00	761
14	2	613	3·51	717
15	2	554	3·63	670
20	1	618	3·40	700
Total .	283	...	...	...

Average Quantity and Quality of Milk Yielded by Cows of Different Ages in the Ayr and Cumnock Districts during an Average of Thirty-two Weeks in the Seasons 1904 and 1905.

Age of cows.	No. of cows reported on.	Average milk in gallons.	Average per cent of fat.	Average milk of 3% of fat in gallons.
2	16	398	3·91	519
3	109	442	3·81	561
4	100	513	3·66	626
5	81	535	3·65	651
6	81	543	3·62	655
7	55	569	3·62	686
8	57	600	3·60	720
9	21	600	3·58	716
10	30	607	3·63	734
11	14	570	3·55	674
12	6	546	3·58	652
13	6	609	3·55	721
14	5	588	3·63	711
15	(1905) 2	554	3·63	670
18	(1903) 1	...	3·74	...
20	(1905) 2	531	3·45	611

or not it is correct when applied to the breed as a whole, and if correct, to remedy it. That it admits of remedy there is no doubt, for some families of cows can scarcely be put dry at all, while others go dry very early, no matter what they are fed on. In selecting a bull for stock purposes it would therefore be well to keep one eye on this point, and the other on the percentage of fat in the milk of the mother, and both on the total quantity that she has yielded over a series of years.

A record has therefore been kept of 815 cows, which is complete for fully more than one-half of them, and for thirty-four weeks for the remainder. In addition to these there were several cows on almost every farm which were tested for a limited time. A good many were sold after the work began, and a few died, so that in almost no case is the number credited to any farm the exact number which that farm keeps, for unless almost a full record was obtained for any animal it was left out of account in the general sheets, although recorded in the book for each farm. None of the farms can therefore be identified with any certainty from the number of cows they are said to have. The book in which the record of each cow is entered has been given a letter, which is marked on the front of the book, so that each member as soon as he receives his book, or knows the letter by which his farm is distinguished, can at once pick out the sheet for his own herd. He has, however, very little chance of being able to identify many of the other stocks. Each owner has therefore the advantage of being able to show his milk record book to any intending purchaser of a cow, bull, or calf, without the disadvantage of suffering in making a sale if his stock happens to be below the average in yield in milk or butter. The good effects of the scheme seem as if they were already being felt in both districts, for during the year a considerable number of cows were sold for no other apparent reason than that they were poor milkers. This is as it should be, and in a very few years will undoubtedly show itself in an increase of the average of those herds where the process of eliminating the unprofitable cows has been judiciously carried out.

While the scheme is primarily intended for the benefit of each farmer, so as to enable him to discard his poor milking cows with as little delay as possible, yet some benefit will be obtained if members compare the produce of their own herds with that of their neighbours. Such a comparison is, however, only useful where the farms are of much the same class; under other conditions nothing is to be gained by it. The scheme is not intended to be in any way competitive, at least in the way of comparing one farm with another. It may, however, be profitably utilised in showing members and others where they may have the best chance of obtaining a bull likely to have a beneficial effect on the milking qualities of the herd.

AVERAGE YIELD OF 10 PER CENT OF THE HEAVIEST AND LIGHTEST MILKING COWS OF EACH HERD, HEIFERS EXCLUDED.

rm.	No. of cows in each herd.	No. reported on.	Dates of calving.	Total milk in gallons.	Average per cent of fat.	Total milk of 3 % of fat in gallons.	Value of the produce at 5d. per gallon.						Average age of the cows.
							Heaviest milkers.			Lightest milkers.			
							£	s.	d.	£	s.	d.	
G	30	3	March 25	808	4·27	1153	24	0	5		...		5
		3	Jan. 26	606	3·78	765		...		15	18	9	6
K	23	2	Feb. 28	624	4·15	869	18	2	1		...		9½
		2	" 18	473	3·80	598		...		12	9	2	8½
B	41	4	March 23	679	3·80	862	17	19	2		..		7½
		4	" 23	470	3·86	607		...		12	12	11	5¼
F	24	2	April 12	653	3·95	862	17	19	2		...		6
		2	May 5	471	3·54	557		...		11	12	1	6⅔
J	25	2	March 16	695	3·68	852	17	15	0		..		11
		2	Feb. 18	310	3·98	412		...		8	11	8	7
E	40	4	April 21	626	3·88	813	16	18	9		...		7¾
		4	March 25	491	3·47	567		..		11	16	3	7¾
D	36	3	" 17	620	3·65	766	15	19	2				7⅔
		3	April 6	417	3·92	527		..		11	19	7	4
C	38	4	March 25	593	3·80	761	15	17	1		...		6¼
		4	Feb. 10	425	3·47	491		..		10	4	7	4½
L	24	2	" 9	537	4·26	761	15	17	1		...		6
		2	March 3	382	3·80	495		...		10	6	3	4½
H	26	3	April 1	592	3·78	746	15	10	10		...		12
		3	Feb. 23	344	3·45	397		...		8	5	5	6⅔
I	20	2	March 9	609	3·63	739	15	7	11		...		11
		2	April 3	376	3·60	452		...		9	8	4	14
A	45	4	March 23	538	3·90	727	15	2	11		...		6
		4	" 26	407	3·44	467		...		9	14	7	6
	372	35	Of the best average		3·90	826	17	4	2		...		8
		35	Of the worst average		3·68	526		...		10	19	2	6⅔
			Difference . .		...	...		...		6	5	0	1⅓

It can never be expected to have all the cows of equal capacity in milk production on any farm, and, like the poor, unprofitable cows are likely to be always with us. The foregoing table and others which have been given clearly indicate that even where the surroundings are identical the produce of the herds may differ to an extraordinary degree. This is mainly accounted for by breeding. Ten per cent of the lowest milking cows of the herd giving the highest yield have even given more milk than an equal proportion of the best of half of the other stocks. This fact holds out great possibilities of the good which may follow from this work, as sooner or later if persisted in it will have a marked effect on the breed.

There is evidently a considerable demand for bulls out of cows which can be certified to have given a large yield of either milk or butter-fat. Each year several applications have been received asking where the farms are which have the heaviest milking cows. A list of the farms in the Milk Record Associations has usually been sent, but without breaking faith with the members of these associations further information cannot meantime be furnished. The time has however arrived when I think the steps should be taken for recording the yield and publishing the names of the owners of exceptional cows. This would be of undoubted advantage to the owners of these cows, and would also be of great benefit to the public.

While any cow can only give her maximum yield of milk, butter, or cheese, if fully fed, it does not follow where a high milk yield or high percentage of butter-fat is shown, that such is the result of heavy feeding. Neither does it follow that heavy feeding will cause a poor milking cow to compare favourably with a good one in yield of either milk or milk products. The facts are almost the very reverse. It has long been proved beyond the possibility of doubt that the ability to yield a large quantity of milk, or milk of a high percentage of fat, must be inherited, as the animals cannot be made to do so simply by supplying them with extra food.

Each of the experts in charge of the stations had instructions to weigh all food used at each visit both summer and winter. A careful analysis has been made of this information, and in many cases the stocks said to receive the greatest weight of food (particularly concentrated food) yielded a much smaller quantity of milk or butter than others more moderately fed. This is a point to which the Scandinavians have devoted much more attention than we have done, but it is one to which we might profitably devote more attention in the near future. I am quite certain that in several cases many of the cows were receiving more food than was good for them, if they got as much food every day as they received on the date of the visit of the expert. If, in the anxiety of the owner to have as large a milk yield as possible, he overfed his animals, as one or two seem to have done, it would have had the effect of reducing the yield of milk instead of increasing it, while its effect on the fat would be infinitesimal.

The experts in charge of both stations have carried out their duties faithfully and well, under conditions which would not always be easy or pleasant. Their byre sheets and books contain some mistakes, but they are not more numerous than one would expect under such circumstances.

CUMNOCK MILK RECORD SOCIETY.

FARM A.

No. of cow.	Total milk in galls.	Average milk per day in lbs.	Average per cent of fat	Total milk of 3 % of fat in galls.	Value of produce at 5d. per gall.			Age of cow.	Size of cow	Date of last calving.	REMARKS.
					£	s.	d.				
2	563	23·6	3·98	747	15	11	3	6	M	March 10	...
48	543	22·8	4·00	726	15	2	6	6	M	April 1	...
20	510	24·3	3·70	722	15	0	10	5	L	" 16	...
14	538	22·6	3·97	712	14	16	8	7	M	March 2	...
33	603	28·7	3·40	712	14	16	8	8	L	April 24	...
13	590	24·8	3·60	708	14	15	0	7	S	March 12	..
47	598	25·1	3·50	705	14	13	9	6	M	" 30	...
36	617	25·9	3·40	702	14	12	6	7	M	" 10	...
34	494	20·8	4·20	693	14	8	9	4	S	" 26	...
40	544	22·7	3·70	677	14	2	1	5	M	" 9	...
19	564	26·9	3·50	667	13	17	11	5	L	" 1	...
30	592	25·0	3·35	662	13	15	10	6	M	" 26	...
25	565	23·7	3·50	658	13	14	2	5	S	" 18	...
27	518	23·1	3·70	658	13	14	2	5	M	April 13	..
39	525	22·0	3·75	657	13	13	9	5	L	March 10	...
6	489	21·8	3·80	656	13	13	4	4	S	April 10	...
32	612	25·8	3·20	649	13	10	5	8	M	March 20	..
1	618	26·0	3·10	645	13	8	9	6	M	" 15	..
24	484	20·3	3·85	620	12	18	4	4	M	" 20	...
31	512	22·8	3·60	619	12	17	11	6	M	Feb. 15	..
43	480	22·9	3·60	609	12	13	9	4	S	April 28	...
28	478	22·7	3·70	604	12	11	8	4	M	" 23	..
15	437	19·5	3·90	587	12	4	7	3	M	" 10	...
12	410	18·3	4·00	572	11	18	4	3	S	" 6	...
38	521	22·0	3·25	570	11	17	6	4	M	March 25	...
46	386	16·2	4·20	543	11	6	3	3	S	" 27	...
17	395	17·7	3·80	530	11	0	10	3	S	April 9	...
44	442	22·5	3·50	526	10	19	2	6	M	May 10	...
26	450	22·9	3·40	518	10	15	10	6	M	March 15	28 weeks
7	404	22·0	3·40	511	10	12	11	6	M	April 8	..
4	458	19 2	3·30	502	10	9	2	7	M	March 11	...
3	371	16·5	3·90	492	10	5	0	3	S	April 10	...
37	331	15·8	4·03	486	10	2	6	3	S	" 16	..
9	365	17·4	3·60	477	9	18	9	3	M	" 16	...
45	384	17·1	3·50	470	9	15	10	3	S	" 11	...
35	356	20·0	4·10	466	9	14	2	3	M	June 7	...
18	404	20 6	3·40	462	9	12	6	5	L	March 10	...
16	361	17·2	3·70	447	9	6	3	3	S	" 28	30 weeks
8	365	17·4	3·40	435	9	1	3	3	M	April 26	...
10	330	17·1	3·80	427	8	17	11	3	M	" 10	...
22	316	17·4	3·70	386	8	0	10	5	L	Jan. 30	26 weeks
23	363	20·0	3·16	384	8	0	0	6	M	April 13	26 "
21	272	16·2	3·66	358	7	9	2	3	S	" 6	24 "
11	251	14·9	4·05	339	7	1	3	3	S	June 5	24 "
42	229	13·6	4·40	333	6	18	9	3	S	Nov. 10	24 "
45		Average .	.	547⅕							

FARM B.

37	673	32·0	3·65	882	18	7	6	7	M	April 29	..
6	679	28·5	3·87	875	18	4	7	5	M	March 15	...
34	708	31·6	3·40	850	17	14	2	8	L	" 18	...
27	658	29·3	3·70	840	17	10	0	10	L	Feb. 27	...
41	639	26·8	3·70	832	17	6	8	7	L	March 2	...

FARM B—*continued.*

No. of cow.	Total milk in galls.	Average milk per day in lbs.	Average per cent of fat	Total milk of 3 % of fat in galls.	Value of produce at 5d. per gall. £	s.	d.	Age of cow.	Size of cow.	Date of last calving.	**Remarks.**
22	571	27·2	4·00	830	17	5	10	13	L	April 28	...
33	661	29·5	3·50	814	16	19	2	7	L	" 1	..
19	588	35·0	4·00	783	16	6	3	12	L	June 7	...
25	694	29·1	3·30	768	16	0	0	9	L	April 1	...
35	614	25·8	3·70	766	15	19	2	8	M	March 5	...
31	596	25·0	3·87	749	15	12	1	7	L	" 24	.
32	554	26·4	3·90	748	15	11	8	10	M	April 27	..
3	626	26·3	3·58	748	15	11	8	4	M	March 16	...
11	710	29·8	3·15	746	15	10	10	8	M	Feb. 28	...
23	569	23·9	3·90	732	15	5	0	3	M	March 4	...
26	629	21·8	3·30	724	15	1	8	10	M	April 5	...
1	652	27·3	3·32	723	15	1	3	4	M	Feb. 25	...
14	629	26·4	3·42	719	14	19	7	14	M	" 28	...
40	555	23·3	3·80	705	14	13	9	3	M	March 9	...
38	513	21·5	4·10	704	14	13	4	8	M	Feb. 27	...
7	640	26·8	3·28	701	14	12	1	5	L	March 12	...
10	495	20·8	4·16	688	14	6	8	6	L	" 9	...
24	567	25·3	3·48	688	14	6	8	4	M	" 15	...
13	503	22·4	3·81	675	14	1	3	4	M	April 1	...
12	577	24·2	3·50	674	14	0	10	8	L	Feb. 25	...
16	501	21·0	4·00	668	13	18	4	7	L	March 22	...
17	527	22·1	3·81	657	13	13	9	4	L	" 20	...
42	486	20·4	4·00	650	13	10	10	8	L	" 26	...
28	518	23·1	3·60	634	13	4	2	6	L	April 2	...
15	462	21·9	3·96	632	13	3	4	4	M	May 1	...
4	483	20·3	3·79	611	12	14	7	5	L	March 20	...
9	481	20·2	3·81	611	12	14	7	6	L	" 20	...
36	461	19·3	3·97	609	12	13	9	3	S	" 9	...
29	531	23·7	3·40	607	12	12	11	6	L	April 16	...
5	432	19·3	3·84	603	12	11	3	4	M	March 21	...
2	437	18·4	4·11	599	12	9	7	5	M	" 15	...
30	456	23·3	3·80	578	12	0	10	3	L	May	28 weeks
18	381	22·7	3·80	495	10	6	3	3	L	June 2	24 "
8	354	21·1	4·17	492	10	5	0	3	M	" 5	24 "
39	395	20·2	3·68	483	10	1	5	3	M	May 12	28 "
20	333	19·8	3·30	368	7	13	4	3	M	" 27	24 "
41		Average .	.	689⅓							

FARM C.

1	685	28·8	3·80	875	18	4	7	9	L	April 6	...
19	605	25·4	3·80	762	15	7	6	6	M	March 1	...
16	550	23·3	3·80	709	14	15	5	6	M	" 16	...
25	533	25·3	3·70	697	14	10	5	4	M	April 15	32 weeks
24	649	27·2	3·20	690	14	7	6	4	L	" 5	...
11	493	20·7	4·05	667	13	17	11	9	L	" 7	...
5	513	21·5	3·85	659	13	14	7	3	M	March 1	...
28	551	23·1	3·50	655	13	12	11	4	S	" 28	...
12	485	28·8	4·00	649	13	10	5	7	M	June 11	24 weeks†
33	533	23·8	3·50	642	13	7	6	6	M	April 16	...
14	450	25·5	3·80	633	13	3	9	11	M	May 13	28 weeks
9	467	19·6	4·05	631	13	2	11	3	M	April 8	...
13	566	23·8	3·30	622	12	19	2	8	L	" 4	...
29	506	21·3	3·70	621	12	18	9	4	S	" 4	...
38	484	24·6	3·20	615	12	16	3	5	L	May 2	...

FARM C—*continued.*

No. of cow.	Total milk in galls.	Average milk per day in lbs.	Average per cent of fat.	Total milk of 3 % of fat in galls.	Value of produce at 5d. per gall.			Age of cow.	Size of cow.	Date of last calving.	REMARKS.
					£	s.	d.				
36	584	27·8	3·10	611	12	14	7	7	L	April 12	31 weeks
27	436	19·4	4·00	600	12	10	0	4	S	„ 20	...
22	445	19·9	4·00	599	12	9	7	4	L	Feb. 21	32 weeks
39	444	19·8	4·00	596	12	8	4		M	April 17	...
18	494	22·0	3·60	595	12	7	11	6	M	March 27	32 weeks
10	434	19·4	4·08	594	12	7	6	3	M	April 23	...
23	472	21·1	3·74	576	12	0	0	4	L	March 2	32 weeks
34	520	28·6	3·20	561	11	13	9	11	L	June 2	26 „
35	499	25·5	3·40	559	11	12	11	7	M	May 10	28 „
26	432	18·1	3·80	550	11	9	2	4	M	April 5	
17	492	20·7	3·35	549	11	8	9	6	L	March 31	
15	462	25·4	3·50	537	11	3	9	6	L	May 24	26 weeks
40	516	23·0	2·93	517	10	15	5	7	M	April 15	...
37	485	20·4	3·20	514	10	14	2	5	M	March 31	...
3	386	17·2	3·80	499	10	7	11	5	L	Feb. 29	...
30	490	21·9	3·04	496	10	6		4	M	March 17	32 weeks
7	413	17·3	3·50	485	10	2	1	4	S	April 6	...
21	410	17·2	3·50	485	10	2	1	4	L	Feb. 18	...
32	382	22·7	3·80	485	10	2	1			June 6	24 weeks
	374	15·5	4·14	480	10	0	0	3	M	March 2	
20	475	26·1	3·00	480	10	0	0	9	M	June 2	26
31	451	26·8	3·10	471	9	16	3	...	L	„ 11	24
8	211	15·0	3·90	307	6	7	11	3	L	April 16	22

38 Average . . 586

† Cow ceased to give milk at or before the date when testing stopped.

FARM D.

29	573	24·0	4·09	782	16	5	10	6	S	March 24	...
34	664	27·9	3·50	758	15	15	10	10	M	„ 27	...
32	624	26·2	3·60	757	15	15	5	7	M	„ 1	.
28	625	26·2	3·60	751	15	12	11	6	S	April 6	...
36	600	25·1	3·63	727	15	2	11	7	M	March 7	...
11	456	21·7	4·10	703	14	12	11	3	M	May 4	...
35	506	22·6	3 90	692	14	8	4	5	M	April 10	..
16	503	21·1	4·10	689	14	7	1	4	S	March 10	...
7	471	19·8	3·56	663	13	16	3	4	S	„ 1	...
31	591	24·8	3·30	655	13	12	11	6	L	„ 13	...
2	515	21·6	3·66	630	13	2	6	7	S	„ 20	...
27	517	21·7	3·60	625	13	0	5	12	L	„ 10	...
25	481	20·3	3·80	623	12	19	7	5	M	„ 7	...
3	550	23·1	3·33	611	12	14	7	4	M	April 9	...
17	470	19·7	3·80	600	12	10	0	4	S	March 15	...
26	468	25·7	3·80	600	12	10	0	3	M	June 1	26 weeks
5	512	21·4	3·55	598	12	9	2	4	L	March 3	...
23	424	20·2	3·80	591	12	6	3	3	M	April 27	..
30	523	22·0	3·30	589	12	5	5	7	L	March 6	...
1	475	22·6	3·37	585	12	3	9	3	S	May 1	30 weeks
33	476	19·9	3·60	573	11	18	9	6	S	March 2	...
4	423	20·2	3·89	566	11	15	10	4	S	April 27	30 weeks
8	477	20·0	3·55	566	11	15	10	4	S	March 3	...
10	440	24·1	3·70	551	11	9	7	3	M	May 30	26 weeks
14	407	19·4	3·70	547	11	7	11	2	...	„ 6	...
21	392	21·5	3·80	508	10	11	8	4	M	June 3	26 weeks
12	350	15·6	4·10	503	10	9	7	4	M	April 20	32 „
13	354	21·0	4·10	487	10	2	11	4	M	June 7	24 „

FARM D—*continued.*

No. of cow.	Total milk in galls.	Average yield per day in lbs.	Average per cent of fat.	Total milk of 3 % of fat in galls.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.	
19	343	22·2	3·70	431	8 19 7	4	M	June 22	22 weeks
6	228	21·3	3·92	430	8 19 2	3	M	" 17	22 "
15	316	18·8	4·05	426	8 17 6	2	M	" 11	24 "
9	287	14·6	4·27	408	8 10 0	3	...	May 14	28 "
18	294	16·2	3·82	374	7 15 10	2	S	" 25	26 "
24	275	15·1	3·80	352	7 6 8	3	L	" 19	26 "
22	277	16·5	3·70	345	7 3 9	2	M	June 7	24 "
20	216	11·8	4·30	315	6 11 3	2	L	May 26	26 "

8	640	32·6	4·00	854	17 15 10	8	L	May 12	28 weeks
33	662	31·5	3·54	817	17 0 5	8	S	" 3	...
31	661	33·7	3·64	803	16 14 7	7	M	10	28 weeks
9	543	22·8	4·20	770	16 0 10	8	M	March 2	
28	530	22·3	4·33	767	15 19 7	3	L	April	
26	543	25·8	4·02	751	15 12 11	8	L	May	
32	577	24·2	3·90	751	15 12 11	6	M	April 11	
34	653	22·4	3·43	746	15 10 10	7	L	March 14	
17	564	23·6	3·91	739	15 7 11	5	S	" 22	...
6	548	23·0	4·00	728	15 3 4	5	L	April 10	...
21	547	24·4	3·90	723	15 1 3	7	M	" 14	...
16	536	29·4	4·01	717	14 18 9	5	S	May 27	26 weeks
19	526	23·5	3·90	704	14 13 4	3	S	April 19	...
5	507	22 6	3·90	684	14 5 0	7	L	" 23	...
24	525	26·8	3·99	682	14 4 2	4	M	May 20	28 weeks
15	500	22·3	3·90	678	14 2 6	4	S	April 12	...
39	525	22·0	3·86	676	14 1 8	5	L	" 11	...
13	492	20·7	4·12	675	14 1 3	6	L	March 15	...
40	538	22·6	3·70	674	14 0 10	5	M	" 31	...
23	569	23·8	3·50	674	14 0 10	9	S	April 6	...
2	500	21·0	4·01	672	14 0 0	3	L	Feb. 9	...
29	482	22·9	3·90	670	13 19 2	4	M	April 23	...
27	527	22·1	3·76	661	13 15 5	6	M	Feb. 17	...
18	585	24·6	3·30	652	13 11 8	5	M	April 3	..
14	531	22·3	3·80	648	13 10 0	4	L	March 25	...
10	580	31·8	3·30	640	13 6 8	4	M	May 28	...
4	545	22·8	3·40	633	13 3 9	5	S	March 20	...
38	586	29·8	3·21	627	13 1 3	6	L	May 12	28 weeks
11	448	20·0	4·00	612	12 15 0	4	M	April 19	...
25	423	20·3	4·04	608	12 13 4	3	M	May 8	...
1	514	22·9	3·45	608	12 13 4	5	S	April 23	...
3	450	18·8	4·03	605	12 12 1	4	M	Feb. 24	
12	432	19·2	4·00	591	12 6 3	3	M	April 16	...
22	488	20·5	3·62	591	12 6 3	8	M	March 25	...
20	522	22·0	3·27	569	11 17 1	8	M	" 30	
30	452	24·8	3·72	561	11 13 9	9	L	May 22	26 weeks
35	541	22·7	3·20	561	11 13 9	10	M	April 5	
7	415	17·4	4·01	555	11 11 3	5	S	March 11	
36	392	16·4	4·18	547	11 7 11	3	M	15	

FARM F.

No. of cow.	Total milk in galls.	Average milk per day in lbs.	Average per cent of fat.	Total milk of 3 % of fat in galls.	Value of produce at 5d. per gall.			Age of cow.	Size of cow.	Date of last calving.	REMARKS
					£	s.	d.				
17	682	28·6	3·80	883	18	7	11	6	M	April 9	...
14	664	27·8	3·80	857	17	17	1	8	M	" 6	...
8	614	27·4	4·10	846	17	12	6	4	L	" 22	...
7	638	30·3	3·70	823	17	2	11	11	M	May 3	...
23	687	28·8	3·50	813	16	18	9	11	M	April 9	...
16	622	26·1	3·60	752	15	13	4	6	M	" 3	...
21	593	24·9	3·70	747	15	11	3	10	M	" 10	...
25	623	29·6	3·30	739	15	7	11	11	M	May 2	...
15	593	24·8	3·40	683	14	4	7	5	M	April 2	...
8	553	23·3	3·60	676	14	1	8	6	M	" 11	...
9	576	24·2	3·50	675	14	1	3	5	M	" 13	...
3	625	26·2	3·20	672	14	0	0	5	L	" 12	...
6	649	27·2	3·10	669	13	18	9	8	L	" 10	...
13	501	23·8	3·60	661	13	15	5	8	M	May 7	...
11	510	28·0	3·80	656	13	13	4	3	M	June 2	...
10	577	25·7	3·20	647	13	9	7	5	M	April 20	...
20	590	24·7	3·20	646	13	9	2	3	M	" 12	...
2	490	23·3	3·50	607	12	12	11	5	M	May 12	...
19	368	17·5	4·60	586	12	4	2	3	L	" 11	...
1	408	18·2	4·10	571	11	17	11	3	S	April 18	...
24	487	24·8	3·40	554	11	10	10	11	M	May 11	...
22	437	19·5	3·30	510	10	12	6	4	M	April 23	...
26	373	17·7	3·80	497	10	7	1	3	M	May 1	...
5	428	19·1	3·30	486	10	2	6	3	M	April 22	...

26	884	39·4	4·20	1267	26	7	11	5	M	April 21	...
19	761	31·9	4·30	1115	23	4	7	5	M	Feb. 28	...
12	780	37·1	3·80	1076	22	8	4	5	M	May 5	...
21	902	37·9	3·50	1064	22	3	4	10	L	Feb. 19	...
8	757	36·0	3·70	1009	21	0	5	9	M	April 29	...
9	794	33·3	3·80	1005	20	18	9	8	L	March 24	...
5	658	27·6	4·50	1004	20	18	4	4	M	" 5	...
14	818	34·3	3·60	1003	20	17	11	6	M	" 19	...
24	802	33·7	3·70	1003	20	17	11	10	M	Feb. 8	...
13	811	38·6	3·30	987	20	11	3	8	L	May 10	...
30	734	30·8	4·00	984	20	10	0	4	S	Jan. 6	...
22	780	34·8	3·50	952	19	16	8	5	L	April 18	...
27	634	28·7	4·10	947	19	14	7	10	M	Feb. 11	...
1	707	29·7	4·00	943	19	12	11	8	L	March 1	...
2	814	34·0	3·50	941	19	12	1	8	M	" 20	...
20	736	30·9	3·70	931	19	7	11	10	L	Feb. 19	...
7	683	29·0	3·90	888	18	10	0	4	L	March 27	...
3	728	34·6	3·50	859	17	17	11	...	L	May 1	...
6	622	29·6	3·80	857	17	17	1	4	M	April 29	...
16	591	24·8	4·20	838	17	9	2	5	L	Nov. 26	...
11	644	27·0	3·80	830	17	5	10	5	S	March 17	...
10	651	27·3	3·70	820	17	1	8	6	L	" 10	...
28	612	27·3	3·90	797	16	12	1	5	S	" 3	32 weeks
4	585	24·6	4·04	789	16	8	9	4	M	" 21	...
15	612	27·4	3·80	786	16	7	6	5	S	" 12	...
17	566	23·7	4·10	785	16	7	1	3	S	Dec. 24	...
25	573	25·5	3·90	779	16	4	7	2	M	April 20	...
18	590	28·1	3·90	769	16	0	5	4	M	Nov. 26	30 weeks
23	616	27·5	3·50	739	15	7	11	9	L	Feb. 13	32 "
29	459	21·8	3·20	507	10	11	3	3	S	May 8	...
30		Average .	.	909½							

FARM H.

No. of cow.	Total milk in galls.	Average milk per day in lbs.	Average per cent of fat.	Total milk of 3 % of fat in galls.	Value of produce at 5d. per gall.			Age of cow.	Size of cow.	Date of last calving.	REMARKS.
					£	s.	d.				
17	651	27·3	3·80	835	17	7	11	5	M	March 27	...
1	618	27·6	3·40	715	14	17	11	20	M	April 13	...
15	506	21·2	4·07	688	14	6	8	11	M	March 25	...
14	599	25·1	3·38	676	14	1	8	9	M	" 19	...
22	555	28·3	3·60	676	14	1	8	7	M	May 6	...
4	604	25·4	3·20	663	13	16	3	9	M	March 26	...
8	489	21·9	3·90	663	13	16	3	5	M	April 6	...
16	549	26·1	3·30	657	13	13	9	8	M	May 2	...
20	541	22·7	3·60	655	13	12	11	4	M	March 27	...
3	575	24·1	3·29	631	13	2	11	7	S	" 20	..
13	498	20·9	3·79	630	13	2	6	7	S	" 13	..
18	557	23·4	3·40	630	13	2	6	9	S	" 15	..
2	521	23·2	3·40	627	13	1	3	4	S	April 11	.
6	536	22·5	3·30	595	12	7	11	4	M	March 29	.
23	469	20·9	3·60	593	12	7	1	6	S	April 10	.
26	512	24·3	3·20	549	11	8	9	6	S	" 30	
19	424	20 2	3 20	500	10	8	4	3	M	" 19	.
10	361	17·2	3·70	493	10	5	5	3	M	" 23	...
21	333	15·8	4·90	488	10	3	4	3	M	May 2	...
24	322	14·4	4·10	455	9	9	7	3	M	April 8	...
7	395	20·1	3·40	453	9	8	9	3	L	May 6	...
9	379	15·9	3·52	445	9	5	5	8	S	Feb. 25	...
25	368	26·3	3·60	442	9	4	2	3	S	July 1	...
11	326	15·5	3·50	383	7	19	7	8	M	Jan. 14	30 weeks
5	328	15·6	3·30	362	7	10	10	4	M	April 2	30 "
12	322	19·1	3·24	348	7	5	0	5	S	June 1	.

26 Average . . 571¼

FARM I.

14	665	29·0	3·30	751	15	12	11	11	L	March 14	...
8	554	23·2	3·90	727	15	2	11	11	M	" 4	..
17	513	22·8	4·10	704	14	13	4	10	M	Jan. 27	32 weeks
16	535	22·4	3·70	675	14	1	3	12	L	Feb. 16	...
9	565	26·9	3·50	672	14	0	0	9	L	" 2	30 weeks
5	585	24·6	3·30	658	13	14	2	15	M	" 27	..
10	539	27·5	3·60	654	13	12	6	12	M	May 5	28 weeks
13	570	23·8	3·40	654	13	12	6	4	M	April 1	.
3	558	23·3	3·40	650	13	10	10	7	M	March 7	..
11	526	25·0	3·40	640	13	6	8	3	M	April 20	..
2	520	21·8	3·60	630	13	2	6	3	L	Feb. 23	..
12	494	22·0	3·50	582	12	2	6	4	S	March 18	32 weeks
1	446	18·7	3·80	574	11	19	2	3	L	Jan. 12	...
20	430	18·0	3·50	509	10	12	1	3	L	March 3	..
18	426	27·6	3·50	500	10	8	4	12	L	May 27	22 weeks†
4	417	22·9	3 50	494	10	5	10	20	L	" 16	26 "
19	350	20 8	3·80	448	9	6	8	3	L	April 16	24 " †
7	319	17 5	4·10	437	9	2	1	.	...	May 20	26 "
6	336	18·4	3 60	410	8	10	10	9	L	Feb. 20	26 "
15	339	17·3	3·60	409	8	10	5	..	S	May 9	28 "

20 Average . . 589

† Cow ceased to give milk at or before the date when testing stopped.

FARM J.

No. of cow.	Total milk in galls.	Average milk per day in lbs.	Average per cent of fat.	Total milk of 3 % of fat in galls.	Value of produce at 5d. per gall.			Age of cow.	Size of cow.	Date of last calving.	REMARKS.
					£	s.	d.				
10	771	32·4	3·30	869	18	2	1	10	M	March 26	...
8	619	26·0	4·04	835	17	7	11	12	M	" 6	...
6	637	26·7	3·79	806	16	15	10	7	M	April 5	...
7	574	24·1	4·00	766	15	19	2	11	L	March 7	...
4	666	28·0	3·40	757	15	15	5	7	L	" 20	...
5	618	26·0	3·65	753	15	13	9	6	M	April 1	...
16	687	28·9	3·20	735	15	6	3	6	M	March 27	...
12	524	22·0	4·13	723	15	1	3	6	S	Feb. 23	...
11	597	25·1	3·61	722	15	0	10	14	S	March 12	...
21	548	23·0	3·90	722	15	0	10	4	S	" 5	..
20	611	25·6	3·40	711	14	16	3	5	M	April 3	...
6	604	25·4	3·40	701	14	12	1	6	M	March 20	...
13	479	22·8	4·37	698	14	10	10	4	S	May 2	30 weeks
22	524	22·0	3·96	685	14	5	5	15	S	March 11	...
2	556	30·6	3·50	651	13	11	3	8	L	Jan. 20	26 weeks
25	472	21·1	3·90	632	13	3	4	4	L	April 18	...
3	479	20·1	3·70	587	12	4	7	10	M	Feb. 20	...
24	410	17·2	4·28	585	12	3	9	5	M	" 25	...
17	286	17·2	4·20	544	11	6	8	3	M	April 14	...
23	432	23·7	3·74	540	11	5	0	5	M	Feb. 9	26 weeks
14	437	18·3	3·60	523	10	17	11	4	S	March 13	...
1	306	24·3	4·10	423	8	16	3	8	L	Feb. 2	18 weeks
9	315	18·7	3·80	401	8	7	1	6	L	March 6	24 "
19	355	18·1	3·20	384	8	0	0	2	S	May 16	28 "
18	286	14·6	3·18	302	6	5	10	2	S	"	28 "
25		Average . .		642¼							

FARM K.

8	630	26·4	4·20	888	18	10	0	10	S	March 17	...
9	619	26 0	4·10	850	17	14	2	9	L	Feb. 18	...
4	706	29·6	3·50	827	17	4	7	5	M	April 1	...
10	608	25·5	3·90	808	16	16	8	10	L	March 1	...
21	668	28·0	3·50	788	16	8	4	7	L	" 17	...
2	577	25·7	3·70	744	15	10	0	10	M	April 19	...
17	547	24·1	3·70	731	15	4	7	10	L	Feb. 28	...
6	505	21·2	4·20	709	14	15	5	3	M	Dec. 31	...
23	415	24·4	3·60	706	14	14	2	6	L	Feb. 15	...
11	568	25·3	3·30	683	14	4	7	6	L	March 8	...
13	528	22·1	3·86	679	14	2	11	3	M	Feb. 11	...
12	526	23·5	3·60	677	14	2	1	6	L	March 13	...
16	474	19·9	4·20	670	14	1	8	3	L	Feb. 11	...
18	476	26·1	4·20	669	14	1	3	3	L	Nov. 12	26 weeks
3	483	24·6	4·10	668	14	0	10	7	M	March 16	28 "
14	477	20·0	4·00	641	13	7	1	3	L	April 4	...
7	473	19·8	3·90	619	12	17	11	4	M	Jan. 7	...
5	502	21·0	3·60	612	12	15	0	3	M	Dec. 30	...
19	452	24·8	4·00	609	12	13	9	3	L	Nov. 25	26 weeks
22	507	27·8	3·50	599	12	9	7	6	L	May 19	26 "
20	439	26·1	4·00	598	12	9	2	11	L	Dec. 4	24 "
25	469	23·9	3·70	579	12	1	3	3	S	May 5	28 "
24	378	18·0	4·00	554	11	10	10	3	L	April 26	...
23		Average .									

FARM L.

No. of cow.	Total milk in galls.	Average milk per day in lbs.	Average per cent of fat.	Total milk of 3% of fat in galls.	Value of produce at 5d. per gall.			Age of cow.	Size of cow.	Date of last calving.	REMARKS.
					£	s.	d.				
13	559	23·8	4·43	826	17	4	2	7	L	Jan. 5	...
12	516	21·4	4·10	696	14	10	0	5	M	March 13	...
24	560	23·5	3·70	694	14	9	2	7	M	„ 31	...
1	459	20·5	4·06	670	13	19	2	6	M	„ 10	...
7	483	21·6	3·90	667	13	17	11	8	L	Jan. 9	...
23	528	22·2	3·70	664	13	16	8	3	M	Feb. 3	...
14	509	22·7	3·80	650	13	10	10	6	L	April 5	...
15	495	20·8	3·85	636	13	5	0	6	L	Feb. 9	...
16	473	21·1	4·00	631	13	2	11	4	M	March 30	...
8	480	20·1	3·90	624	13	0	0	3	M	„ 30	...
20	458	20·4	3·58	583	12	2	11	4	M	Feb. 19	...
17	440	26·2	3·90	578	12	0	10	3	L	June 4	24 weeks
11	429	21·8	3·96	567	11	16	3	5	M	March 13	28 „
21	446	19·9	3·60	567	11	16	3	4	L	Feb. 9	...
6	464	19·5	3·60	563	11	14	7	6	M	„ 9	...
5	410	18·3	3·80	562	11	14	2	3	M	Jan. 25	...
4	474	19·9	3·50	557	11	12	1	4	M	March 14	...
22	399	23·7	4·12	548	11	8	4	7	L	Jan. 11	24 weeks
9	419	21·4	3·90	545	11	7	1	5	M	„ 21	28 „
2	421	25·1	3·76	529	11	0	5	6	M	„ 12	24 „
19	353	16·8	3·90	518	10	15	10	4	L	Feb. 12	...
18	412	19·6	3·40	472	9	16	8	5	M	March 21	...
10	331	19·7	3·80	421	8	15	5	3	L	June 10	24 weeks
3	316	20·5	3·96	418	8	14	2	4	M	„ 18	22 „ †

24 Average . . 591

† Cow ceased to give milk at or before the date when testing stopped.

AVERAGE COMPOSITION OF 360 SAMPLES OF EVENING AND MORNING MILK FROM ALL THE FARMS FOR THIRTY WEEKS FROM THE BEGINNING OF MAY TILL THE END OF NOVEMBER.

Farm	EVENING. Average per cent of fat.	MORNING. Average per cent of fat.
A	3·85	3·89
B	3·91	3·92
C	3·86	3·72
D	3·92	3·82
E	4·02	3·89
F	3·87	3·75
G	4·06	3·91
H	3·71	3·70
I	4·00	3·62
J	4·02	3·95
K	4·16	4·13
L	4·11	3·98
Average .	3·97	3·87
Difference .	...	·10

The greatest difference is on stock I, where it is ·38 per cent of fat less in the morning than the evening. The hour of milking at this farm varied somewhat more than at any of the others, although the hour of morning and evening milking did not differ much from the others. A careful comparison of the daily milk-yield with the hour of milking seems to indicate that any variation in the hour of milking seems to have some influence in lessening the per cent of fat in the milk. If stock I is excluded, the difference is only ·076 per cent of fat between the milk of the evening and morning.

In the early part of the year all the farms divided the intervals of milking into two equal periods of 12 hours, but in autumn the morning milking was usually half an hour later than in the evening. This made milking intervals of 12½ and 11½ hours, which does not seem to have had the depressing effect on the percentage of fat which a difference in the intervals of milking usually brings about.

Average Quality of Mixed Morning and Evening Milk at each Farm for the whole Season.

Farm.	Average for the year	1st visit.	2nd visit	3rd visit.	4th visit.	5th visit.	6th visit.	7th visit.	8th visit.	9th visit.	10th visit.	11th visit.	12th visit.	13th visit.	14th visit.	15th visit	16th visit.	17th visit.
		% fat.	% fat.	% fat.	% fat.	% fat	% fat.	% fat.	% fat	% fat.	% fat.	% fat.	% fat.	% fat.	% fat.	% fat.	fat.	fat
A	3·80	3·38	3·46	3·39	3·30	3·40	3·36	3·42	3·73	3·70	3·73	3·99	4·07	4·13	3·97	4·50	4·18	4·54
B	3·71	3·29	3·00	3·27	3·32	3·51	3·73	3·55	3·72	3·74	3·78	4·11	3·99	4·13	4·33	4·30	4·44	4·54
C	3·69	3 21	3·33	3·37	3·12	3·45	3·60	3·35	3·40	3·60	3·85	4·03	4·07	3·88	4·38	3·87	3·98	4·00
D	3·78	3·51	3 22	3·38	3·37	3·65	3·73	3·90	3·70	3·70	3·72	3·89	3·95	4·11	4·12	4·10	4·17	4 04
E	3·87	3·54	3·56	3·58	3·16	3 62	3·62	3·69	3·61	3·81	3·90	4·03	4·10	4·16	4·33	3·96	4·33	4·51
F	3·72	3·68	3·17	3·53	3·26	3·28	3·40	3·57	3·49	3·84	3·59	3·69	3·85	3 82	4·17	4·34	4·35	4·28
G	3·94	3·82	3 78	3·77	3·53	3·69	3·69	3 71	3·72	3·70	3·93	4·29	4·16	4·19	4·37	4·26	4·21	4·16
H	3·59	3·01	3·23	3·31	3·47	3·30	3·44	3·43	3·47	3·54	3·65	3·65	3·72	3·85	3·80	4·08	4·08	4·02
I	3 74	3·61	3·38	3 13	3·50	3·28	3·51	3·55	3·38	3·54	3·80	3·80	3·79	4·07	4·20	4·13	4 49	4 46
J	3·90	3·54	3·31	3·55	3 33	3·59	3·64	3·48	3·74	3·69	4·01	3·99	4·20	4·26	4·36	4·39	4·12	4 73
K	4·00	3·31	3·31	3·43	3·61	3·73	3·67	3·83	3·81	3·89	4·09	4·21	4 40	4·48	4·65	4·55	4·47	4·59
L	3·95	3·55	3·35	3·78	3 61	3·74	3·72	3·74	3·78	3·94	4·02	4·06	4·31	3·81	4·32	4·12	4 78	4·63
		41·48	40·10	41·49	41·18	42·24	43·11	43·22	43·55	44·69	46·07	47·74	48·61	48·89	51·00	50 60	52 20	52·50
		3·457	3 342	3·457	3 432	3·520	3·592	3·602	3·629	3·724	3·922	3·979	4·051	4·074	4·250	4·22	4·350	4·375

AVERAGE COMPOSITION OF THE EVENING AND MORNING MILK OF EACH FARM DURING THE MONTHS OF MAY, JUNE, AND JULY.

Farm.	EVENING. Average per cent of fat.	Increase of fat in the evening over the morning.	MORNING. Average per cent of fat.	Increase of fat in the morning over the evening.
A	3·46	...	3·50	·04
B	3·53	...	3·54	·01
C	3·57	·20	3·37	...
D	3·62	...	3·66	0·4
E	3·74	·16	3·58	...
F	3·45	...	3·39	...
G	3·77	·06	3·66	...
H	3·52	·12	3·40	...
I	3·62	·35	3·27	...
J	3·66	...	3·66	...
K	3·78	·07	3·71	...
L	3·80	·15	3·65	...
Average .	3·62	...	3·53	...
Difference	...	...	·09	...

AVERAGE COMPOSITION OF THE EVENING AND MORNING MILK OF EACH FARM DURING THE MONTHS OF SEPTEMBER, OCTOBER, AND NOVEMBER.

Farm.	EVENING. Average per cent of fat.	Increase of fat in the evening over the morning.	MORNING. Average per cent of fat.	Increase of fat in the morning over the evening.
A	4·27	...	4·31	·04
B	4·28	...	4·32	·04
C	4·07	·04	4·03	...
D	4·07	...	4·16	·09
E	4·34	·12	4·22	...
F	4·15	...	4·16	·01
G	4·32	·13	4·19	...
H	3·96	...	4·00	·04
I	4·37	·33	4·04	...
J	4·42	...	4·42	...
K	4·60	·08	4·52	...
L	4·38	·06	4·32	...
Average .	4·27	...	4·22	...
Difference	...	...	·05	...

Average Composition of the Evening and Morning Milk of each Farm from the Beginning of the Last Week in July to the end of the First Week in September.

Farm.	Evening. Average per cent of fat.	Increase of fat in the evening over the morning.	Morning. Average per cent of fat.	Increase of fat in the morning over the evening.
A	3·82	...	3·85	·03
B	3·90	·02	3·88	...
C	4·00	·22	3·78	...
D	3·90	·23	3·67	...
E	4·07	·22	3·85	...
F	3·80	·13	3·67	...
G	4·13	·28	3·85	...
H	3·55	...	3·65	·10
I	4·03	·58	3·45	...
J	3·93	·06	3·87	...
K	4·03	...	4·17	·14
L	4·17	·22	3·95	...
Average .	3·94	...	3·80	...
Difference	...	...	·14	...

Average Quantity and Quality of Milk Yielded by Thirty-Four Cows in the Cumnock District when in Season.

		Over average.	Average.	Under average.
Weight of milk	No. of instances . .	7	19	8
	Average in lb. per day	37·75	31·71	23·75
Composition of milk	No. of instances . .	18	11	5
	Average per cent of fat	4·22	3·50	3·40

VARIATION IN THE QUANTITY AND QUALITY OF MILK DURING THE FIRST SIXTEEN WEEKS OF THE PERIOD OF LACTATION OF THE COWS IN THE CUMNOCK MILK RECORD ASSOCIATION, 1905.

No. of weeks from date of calving.	No. of animals reported on.	Average milk per day in lb.	Average per cent of fat in the milk.	Average weight of fat in the milk of one day in lb.
Under 1 week	60	27·5	3·59 } Average 3·62	0·9872 } Average 1·0517
" 2 "	61	30·5	3·66 }	1·1163 }
" 4 "	153	30·0	3·35	1·0050
" 6 "	165	30·9	3·33	1·0289
" 8 "	166	31·5	3·38	1·0647
" 10 "	167	31·4	3·38	0·0613
" 12 "	167	30·3	3·53	1·0696
" 14 "	166	29·0	3·60	1·0440
" 16 "	154	28·2	3·65	1·0293

VARIATION IN THE QUANTITY AND QUALITY OF MILK DURING THE FIRST SIXTEEN WEEKS OF THE PERIOD OF LACTATION OF THE COWS OF THE AYR DISTRICT IN 1904 AND CUMNOCK DISTRICT IN 1905.

No. of weeks from date of calving.	No. of animals reported on.	Average milk per day in lb.	Average per cent of fat in the milk.	Average weight of fat in the milk of one day in lb.
Under 1 week	98	27·0	3·65	·9855
" 2 "	158	29·5	3·52	1·0384
" 4 "	302	31·2	3·29	1·0264
" 6 "	373	31·6	3·32	1·0491
" 8 "	409	31·8	3·34	1·0621
" 10 "	388	32·1	3·36	1·0685
" 12 "	342	32·3	3·47	1·1208
" 14 "	280	31·1	3·52	1·0947
" 16 "	154	28·2	3·65	1·0293

FENWICK MILK RECORD SOCIETY.

FARM A.

No. of cow.	Total milk in galls	Average milk per day in lbs.	Average per cent of fat	Total milk of 3 % of fat in galls.	Value of the produce at 5d. per gall.			Age of cow.	Size of cow.	Dates of calving.	No. of weeks in milk.
					£	s.	d.				
	886	26·3	5·10	1523	31	14	7	3	M	Nov. 20 " 7	48 weeks
1	780	28·5	3 90	1020	21	5	0	5	L	Jan. 3	39 "
13	848	28·8	3·30	956	19	18	4	5	M	" 4, 1905 Dec. 10, 1905	42 "
23	639	21·7	4·40	955	19	17	11	5	L	April 1	42 "
18	706	22·4	3 90	939	19	11	3	7	S	March 4	45 "
16	729	23·1	3·70	921	19	3	9	3	M	Oct. 16 Aug. 6	45
7	679	26·9	3·70	879	18	6	3	6	M	March 11	
24	658	22·4	3·90	872	18	3	4	5	L	June 25	42
28	729	23·1	3·50	868	18	1	8	7	M	March 4	45
11	560	17·7	4·60	863	17	19	7	4		Nov. 1 " 3	45
25	606	20·6	4·20	849	17	13	9	6	M	March 23	42
5	724	26·5	3·40	841	17	10	5	5	L	Jan. 5	39
15	646	21·9	3·90	841	17	10	5	3		Oct. 25 Nov. 1	42
14	705	25·8	3·50	836	17	8	4			" 20 " 27	39
	610	22·3	4·10	835	17	7	11		L	28 20	
6	594	21·7	4·10	818	17	0	10	4	S	April	
4	655	20·8	3·30	719	14	19	7	5	M	" 25 " 27	
	475	16·1	3·90	623	12	19	7	6	M	Sept. 1 Dec. 18	39
12	513	20·3	3·50	608	12	13	4	-		May 20	36
17	540	18·3	3·30	603	12	11	3	3	S	July 3 June 10	42
2	461	21·9	3·70	574	11	19	2	4	L	May 16	30
22	319	19·0	4·30	459	9	11	3	3	M	25	24
22		Average .	.	699½							40¼ weeks

FARM B.

No. of cow.	Total milk in galls	Average milk per day in lbs.	Average per cent of fat	Total milk of 3 % of fat in galls.	£	s.	d.	Age of cow.	Size of cow.	Dates of calving.	No. of weeks in milk.
15	932	29·6	4·30	1339	27	17	6	7	M	Dec. 3 " 10	45 weeks
25	1011	32·1	3·50	1185	24	13	9	4	M	Nov. 4 Oct. 12	45 "
16	998	31·7	3·50	1168	24	6	8	6	M	Dec. 10	45 "
21	1002	31·8	3·40	1154	24	0	10	6	M	" 25 Nov. 24	45 "
1	806	22·5	4·10	1125	23	8	9	4	M	Jan. 14	51 "
22	790	25·1	4·29	1103	22	19	7	3	M	Sept. 18 " 1	45 "
6	910	25·4	3·60	1096	22	16	8	7	M	Dec. 17	51 "
19	977	38·8	3·33	1077	22	8	9	10	L	May 17	36 "
9	868	27·5	3·60	1051	21	17	11	4	M	Jan. 1	45 "
18	819	27·0	3·70	1035	21	11	3	3	M	Nov. 4 " 7	45 "
13	877	27·9	3·40	1023	21	6	3	6	M	Oct. 20 Aug. 19	45 "
14	864	27·4	3·50	1023	21	6	3	7	M	Oct. 22	45 "

Farm B—*continued.*

No. of cow.	Total milk in galls	Average milk per day in lbs.	Average per cent of fat	Total milk of 3 % of fat in galls.	Value of the produce at 5d per gall	Age of cow	Size of cow.	Dates of calving.	No. of weeks in milk.
					£ s. d.				
17	813	27·6	3·50	972	20 5 0	3	L	Nov. 7 " 1	42 weeks
11	751	25·5	3·80	969	20 3 9	4	S	Jan. 31	42 "
2	729	28·9	3·80	944	19 13 4	7	M	April 15	36 "
27	776	26·4	3·60	943	19 12 11	4	M	March 30	42 "
3	780	24·7	3·60	940	19 11 8	3	M	" 18	45 "
23	736	25·0	3·70	919	18 12 11	3	M	Oct. 24 " 13	42 "
24	860	34·1	3·10	905	18 17 1	8	M	Sept. 7 Aug. 17	36 "
20	777	28·4	3·40	886	18 9 2	4	M	March 28	39 "
5	739	25·2	3·50	882	18 7 6	6	M	Feb. 3 Jan. 9	42 "
12	795	29·1	3·10	843	17 11 3	7	M	March 26	39 "
26	616	22·5	4·00	832	17 6 8	3	S	Oct. 25 " 13	39 "
4	698	23·7	3·50	829	17 5 5	4	M	April 8	42 "
10	725	26·5	3·40	827	17 4 7	5	M	" 21	39 "
8	497	23·7	3 90	645	13 8 9	3	M	June 1	30 "
26		Average . .		989					$42\frac{2}{7}$ weeks

FARM C.

25	1186	37·6	3·90	1554	32 7 6	10	M	Feb. 6	45 weeks
26	1305	41·4	3·50	1533	31 18 9	5	L	Mar. 19	45 "
22	1135	35·3	4·00	1518	31 12 6	11	L	Feb. 10	45 "
23	1151	32·0	3·90	1488	31 0 0	10	...	" 8	42 "
8	1043	27·5	4·10	1443	30 1 3	3	L	Aug. 20 Dec. 3*	54 "
24	1048	35·6	3·70	1311	27 6 3	7	L	Jan. 26	42 "
17	1043	35·4	3·70	1291	26 17 11	8	M	Dec. 5	42 "
13	935	26·1	4·50	1268	26 8 4	5	M	" 2 Oct. 9	51 "
9	879	24·6	4·10	1221	25 8 9	4	M	Nov. 27 Aug. 19†	51 "
28	960	35·1	3·60	1176	24 10 0	. .	S	May 1	39 "
14	808	27·4	4·30	1172	24 8 4	5	M	March 30	42 "
19	826	24·6	4·20	1160	24 3 4	4	M	Sept. 2 Aug. 1	48 "
16	730	20·4	4·30	1057	22 0 5	7	M	July 20 Aug. 25	51 "
7	890	28·2	3·50	1055	21 19 7	4	L	Oct. 30 Sept. 1	45 "
20	952	32 3	3·10	1009	21 0 5	7	M	Dec. 3 " 21	42 "
18	802	27·2	3·60	966	20 2 6	5	L	March 16	42 "
12	659	24·1	4·30	955	20 2 1	4	M	Oct. 30	39 "
11	692	25·3	3·80	886	18 9 2	3	L	June 27 Nov. 5	39 "
27	618	24·5	4·20	881	18 7 1	6	L	March 26	36 "
30	631	27·3	4·00	857	17 17 1	3	M	June 10	33 "
1	549	26·1	4·40	820	17 1 8	8	M	Sept. 30, 1904	30 "
6	585	19·9	4·10	813	16 18 9	3	L	Nov. 6	42 "

* Calved six weeks too early. † Aborted.

FARM C—*continued.*

No. of cow.	Total milk in galls.	Average milk per week in galls.	Average per cent of fat	Total milk of [illegible] of fat in galls.	Value of the produce at 5d. per gall. £	s.	d.	Age of cow	Size of cow	Dates of calving.	No. of weeks in milk.
10	633	18·8	3·80	805	16	15	5	3	M	Oct. 30	48 weeks
3	652	23·9	3·50	781	16	5	5	4	M	July 20 Aug. 17	39
15	673	22·9	3·40	769	16	0	5	5	M	Sept. 20	42
21	503	17·1	3·80	659	13	14	7	6		April 1, 1904 Jan. 13, 1906	42
	479	22·8	3·60	573	11	18	9	4		Sept. 12, 1904	30
		Average . .		1075							42$\frac{4}{7}$ weeks

FARM D.

6	815	29·8	4·40	1207	25	2	11	9		April 24	39 weeks
9	963	30·5	3·60	1172	24	8	4	5		Oct. 28, 1904 Nov. 26, 1905	45
7	891	26·5	3·80	1135	23	12	11	10		April 28, 1904 " 29, 1905	48
12	685	25·1	4·30	982	20	9	2	8		11	[illegible]
13	677	21·4	4·25	958	19	19	2		M	June 26, 1904 May 11, 1905	45
10	677	23·0	4·20	948	19	15	0	5	M	" 20, 1904 June 29, 1905	42
4	731	23·2	3·60	897	18	13	9	4	M	Dec. 28, 1904	45
11	700	25·6	3·80	897	18	13	9	6	S	April 20	39
8	704	23·9	3·75	881	18	7	1	6	M	" 8	42
5	583	23·1	4·18	809	16	17	1	4	M	May 18	36
2	604	17·9	3·90	789	16	8	9	3	M	Jan. 22	48
	496	13·8	4·20	706	14	14	2	3	M	" 31	51
	484	20·9	3·30	544	11	6	8	2	M	May 27	33
13		Average . .		917¼							42$\frac{3}{7}$ weeks

FARM E.

5	1035	37·9	3·40	1182	24	12	6	7	M	April 24	39 weeks
20	909	24·0	3·50	1065	22	3	9	3	L	Dec. 11	54 "
15	830	28·2	3·70	1054	21	19	2	4	M	Aborted Feb. 3	42 "
6	893	30·4	3·40	1031	21	9	7	7	M	Dec. 6, 1904 Nov. 29, 1905	42 "
9	954	30·3	3·10	1009	21	0	5	4	M	" 2, 1904 Sept. 28, 1905	45 "
1	693	27·5	4·10	960	20	0	0	12	L	March 19	36 "
12	788	26·8	3·50	940	19	11	8	5	M	Jan. 21	42 "
7	772	26·2	3·60	938	19	10	10	8	L	March 21	42 "
11	882	30·0	3·10	930	19	7	6	8	M	Feb. 16	42 "
17	760	22·6	3·50	908	18	18	4	3	M	Sept. 25, 1904* July 23, 1905	48 "
13	886	30·1	3·00	880	18	6	8	8	M	Jan. 7	42 "
8	731	24·8	3·50	872	18	3	4	6	S	Feb. 16	42 "

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* Prematurely.

FARM E—*continued.*

No. of cow.	Total milk in galls.	Average milk per day in lbs.	Average per cent of fat	Total milk of 3 % of fat in galls.	Value of the produce at 5d. per gall.			Age of cow.	Size of cow.	Dates of calving.	No. of weeks in milk.
					£	s.	d.				
10	747	23·7	3·40	866	18	0	10	4	M	Oct. 1, 1904* Sept. 6, 1905	45 weeks
14	725	23·0	3·50	847	17	12	11	4	M	Nov. 9, 1904* Sept. 10, 1905	45 "
19	692	21·9	3·50	808	16	16	8	3	M	Dec. 28	45 "
3	604	23·4	3·90	798	16	12	6	5	M	Aborted March 19	42 "
16	700	25·6	3·40	798	16	12	6	9	M	" 13	39 "
18	731	24·8	3·20	795	16	11	3	3	M	Oct. 10, 1904* " 20, 1905	42 "
4	566	17·9	3·80	731	15	4	7	3	M	Sept. 7, 1904* Aug. 7, 1905	45 "
2	609	22·3	3·40	697	14	10	5	8	M	April 15	39 "
21	592	20·1	3·40	686	14	5	10	3	S	Dec. 4, 1904 Sept. 7, 1905	42 "
21		Average . .		895							42$\frac{6}{7}$ weeks

FARM F.

12	1108	31·0	3·70	1394	29	0	10	4	S	Nov. 7, 1904 Sept. 27, 1905	51 weeks
2	1084	34·4	3·70	1338	27	17	6	5	M	Dec. 8, 1904 Nov. 6, 1905	45 "
11	1177	35·0	3·30	1321	27	10	5	4	L	Dec. 5, 1904 " 10, 1905	48 "
5	1024	30·5	3·70	1271	26	9	7	5	M	Nov. 20, 1904 Oct. 10, 1905	48 "
10	971	27·1	3·50	1160	24	3	4	4	L	" 30, 1904 " 2, 1905	51 "
15	817	24·3	4·20	1160	24	3	4	3	M	Nov. 17, 1904	48 "
4	892	28·3	3·70	1113	23	3	9	10	L	March 25, 1904 " 27, 1905	45 "
8	1077	34·2	3·09	1110	23	2	6	9	L	" 3	45 "
3	910	27·1	3·40	1051	21	17	11	5	L	Jan. 4, 1905 Nov. 30, 1905	48 "
1	885	28·1	3·50	1043	21	14	7	5	M	Dec. 22, 1904 Nov. 15, 1905	45 "
14	827	26·2	3·60	1016	21	3	4	3	M	Jan. 11, 1904 Dec. 11, 1905	45 "
7	674	26·7	4·00	864	18	0	0	3	S	April 27	36 "
13	663	24·3	3·80	858	17	17	6	4	S	Aug. 1, 1904 Sept. 23, 1905	39 "
6	598	21·9	3·70	750	15	12	6	3	L	May 1	36 "
14		Average . .		1103½							45 weeks

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* Prematurely.

FARM G.

No. of cow.	Total milk in galls.	Average milk per day in lbs.	Average per cent of fat	Total milk of 3 % of fat in galls.	Value of the produce at 5d. per gall.			Age of cow.	Size of cow.	Dates of calving.	No. of weeks in milk.
					£	s.	d.				
12	770	24·4	3·90	1006	20	19	2	4	M	Jan. 29	45 weeks
4	728	23·1	3·80	938	19	10	10	12	L	Feb. 20* Dec. 8, 1905	45 "
1	596	16·1	4·40	884	18	8	4	3	M	" 18, 1904	51 "
11	611	22·4	4·10	842	17	10	10	5	M	April 15	39 "
6	634	21·5	3·80	808	16	16	8	7	M	" 7	42 "
8	600	21·9	4·00	800	16	13	4	8	S	" 14	39 "
7	701	23·8	3·20	762	15	17	6	4	L	" 5	45 "
2	616	19·5	3·60	749	15	12	1	3	M	Dec. 8, 1904 Jan. 3, 1906	45 "
3	534	21·2	3·40	620	12	18	4	5	M	March 19	36 "
13	418	18·0	4·10	583	12	2	11	3	M	May 30	33 "
5	421	18·2	3·90	552	11	10	0	3	M	April 25	33 "
10	366	13·2	4·40	540	11	5	0	3	M	May 1	39 "
9	381	15·1	3·90	503	10	9	7	3	S	April 10	36 "
13		Average . .		737½							40$\frac{4}{7}$ weeks

FARM H.

30	1312	39·0	3 80	1679	34	19	7	6	L	Nov. 25 " 14	48 weeks
8	1073	31·9	4·12	1473	30	13	9	7	M	Aug. 30 " 14	48 "
28	1194	33·4	3·60	1433	29	17	1	6	M	Dec. 10 " 27	51 "
10	915	37·1	4·40	1360	28	6	8	6	M	March 13	39 "
25	1153	34·3	3·40	1342	27	19	2	6	S	Aug. 19 " 9	48 "
15	1140	36·2	3·50	1331	27	14	7	12	S	March 14	45 "
27	1095	32·6	3·60	1314	27	7	6	6	M	Jan. 26 Dec. 26	48 "
16	1122	35·6	3·50	1311	27	6	3	5	M	March 14	45 "
11	1095	32·6	3·50	1302	27	2	6	11	M	Aug. 19 " 12	48 "
19	1264	35·3	3·00	1302	27	2	6	6	S	Dec. 10	51 "
7	1142	34·0	3·30	1278	26	12	6	7	M	Aug. 22 Sept. 7	48 "
18	1043	31·0	3·60	1273	26	10	5	6	M	March 28 " 7	48 "
24	1123	35·6	3·30	1254	26	2	6	6	S	" 1 " 31	45 "
26	1076	34·1	3·40	1230	25	12	6	7	M	Aug. 27 Sept. 8	45 "
†1	818	22·9	4·40	1226	25	10	10	4	M	...	51 "
12	934	27·7	3·80	1198	24	19	2	3	M	Nov. 11 Oct. 26	48 "
6	990	29·4	3·40	1131	23	11	3	7	S	Jan. 18	48 "
20	815	29 8	4·00	1097	22	17	1	10	M	Feb. 15	39 "
9	864	25·7	3·50	1007	20	19	7	3	L	Sept. 23 Aug. 17	48 "
34	757	19·5	4·00	989	20	12	1	3	S	Oct. 12	54 "
13	607	22·4	4·50	923	19	4	7	4	M	" 20* Sept. 16	45 "

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* Aborted.

† Aborted two years in succession.

FARM H—*continued.*

No. of cow.	Total milk in galls	Average milk per day in lbs.	Average per cent of fat	Total milk of 3 % of fat in galls.	Value of the produce at 5d per gall.			Age of cow.	Size of cow.	Dates of calving.	No of weeks in milk
					£	*s.*	*d.*				
4	767	26·1	3·60	919	19	2	11	6	M	Jan. 11 Dec. 20	42 weeks
22	750	27·4	3·50	888	18	10	0	7	M	" 1	39 "
36	632	20·0	4·10	883	18	7	11	3	L	March 1	45 "
31	641	20·3	3·90	832	17	6	8	3	L	Nov. 28 Dec. 2	45 "
21	623	24·7	3·80	792	16	10	0	12	M	April 20 May 9	36* "
14	559	16·6	4·00	751	15	12	11	4	M	Jan. 21 Dec. 21	48 "
33	568	19·3	3 50	679	14	2	11	3	M	Aug. 22† " 16	42 "
17	627	20·0	3·20	672	14	0	0	9	L	March 11† " 5	45 "
5	523	14·6	3·80	668	13	18	4	4	M	" 20	51 "
3	488	17·8	4·00	655	13	12	11	4	M	April 20	39 "
29	481	17·6	3·20	521	10	17	1	7	S	Jan. 10†	39 "
32		Average . .		1084⅔							45½ weeks

FARM I.

14	785	20·7	4·20	1101	20	17	1	7	M	Oct. 28† Dec. 14	54 weeks
23	838	28·5	3·50	999	20	16	3	6	M	March 1	42 "
30	851	28·9	3·40	968	20	3	4	10	L	May 10 April 26	42 "
16	788	28·8	3·50	937	19	10	5	7	M	" 5	39 "
15	697	18·4	4·00	934	19	9	2	5	S	Dec. 27	54 "
32	795	25·2	3 40	905	18	17	1	8	M	March 10	45 "
26	829	28·2	3·10	879	18	6	3	6	M	Dec. 28 " 23	42 "
25	679	24·8	3·70	840	17	10	0	6	S	" 26 Feb. 1	39 "
24	730	23·1	3 40	830	17	5	10	10	M	March 3	45 "
1	699	20·7	3 60	817	17	0	5	3	S	June 8 May 10	48 "
5	712	26·1	3·40	816	17	0	0	5	S	March 16	39 "
9	689	21·8	3·50	805	16	15	5	6	M	" 1	45 "
37	682	27·0	3·50	801	16	13	9	7	. .	" 25	36 "
21	584	19·8	4·10	798	16	12	6	3	M	Dec. 30 Nov. 26	42 "
8	660	22·4	3 50	785	16	7	1	8	M	" 14 Oct. 25	42 "
10	649	22·0	3·60	781	16	5	5	6	M	April 15 " 15	42 "
35	654	23 9	3·40	762	15	17	6	8	L	March 18	39 "
22	649	19·3	3·40	749	15	12	1	3	M	Nov. 27	48 "
13	643	21·8	3·40	743	15	9	7	3	M	April 4	42 "
31	526	20·8	4·10	723	15	1	3	5	M	May 1	36 "
27	594	18 8	3 60	721	15	0	5	6	L	Nov. 30	45 "
38	658	22·3	3·20	711	14	16	3	7	M	March 20	42 "
18	554	18 8	3 60	686	14	5	10	4	M	" 30	42 "
17	597	21·8	3·39	674	14	0	10	4	M	April 23	39 "

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* Cow ceased to give milk at the end of this period.

† Aborted.

FARM I—*continued.*

No. of cow.	Total milk in galls.	Average yield per day in lbs.	Average per cent. of fat	Total milk of 3% of fat in galls.	Value of the produce at 5d. per gall.			Age of cow.	Size of cow.	Dates of calving	No of weeks in milk.
					£	s	d.				
20	630	21·4	3·00	660	13	15	0	4	S	April 10 May 6	42 weeks
11	538	17·0	3·60	657	13	13	9	3	S	June 1 Sept. 3	45 ″
4	494	13·1	3·90	656	13	13	4	2	S	Aug. 5* Oct. 8	54 ″
19	481	19·1	3·90	628	13	1	8	4	M	March 10	36 ″
33	425	18·3	3·80	537	11	3	9	2	S	June 1	33 ″
2	475	18·3	3·10	494	10	5	10	3	S	May 10	36 ″
28	427	16·9	3·30	477	9	18	9	2	S	″ 5	36 ″
34	364	17·3	3·10	382	7	19	2	2	M	June 20	30 ″
		Average . .		758							$41\frac{6}{7}$ weeks

FARM J.

No. of cow.	Total milk in galls.	Average yield per day in lbs.	Average per cent. of fat	Total milk of 3% of fat in galls.	£	s	d.	Age of cow.	Size of cow.	Dates of calving	No of weeks in milk.
4	714	24·3	3·90	952	19	16	8			April 4	42 weeks
2	598	20·3	4·70	949	19	15	5			Dec. 30* Oct. 10	42 ″
23	676	20·1	4·10		19	10	0			″ 12 Sept. 30	48 ″
8	714	22·6	3·90	934	19	9	2			March 9	45 ″
28	790	23·5	3·50	928	19	6	8			Oct. 8 Nov. 12	
3	688	25·2	3·90	915	19	1	3			Oct 11	39
29	638	21·7	4·10	878	18	5	10			Nov. 26	42
26	696	23·7	3·70	858	17	17	6			March 22	42
30	573	20·9	4·40	852	17	15	0			″ 27	39
9	822	27·9	3·00	839	17	9	7			″ 14	45
5	667	24·4	3·60	820	17	1	8			April 3	39
6	721	22·9	3·30	815	16	19	7			March 11	45
27	671	24·6	3·60	815	16	19	7			Dec. 20 Oct. 1	
	592	21·6	4·10	809	16	17	1			″ 8 Nov. 7	
25	601	23·8	4·00	809	16	17	1	5	M	Feb. 8	36
12	698	25·6	3·40	799	16	12	11	6	L	March 4	39
11	648	22·0	3·60	793	16	10	5	8	M	April 25 May	48
17	711	26·0	3·30	788	16	8	4	9	M	April 13	39
7	654	22·2	3·60	785	16	7	1	7	M	March 27	42
14	606	24·1	3·70	759	15	16	3	4	L	Jan. 11	36
10	561	19·0	4·00	754	15	14	1	5	M	Oct. 2	42
24	541	21·5	4·00	738	15	7	6	5	M	May 19 ″	36
21	691	25·3	3·10	737	15	7	1	9	L	March 27	39
15	577	21·0	3·80	734	15	5	10	6	S	April 13	39
16	630	30·0	3·40	733	15	5	5	7	M	19	30
20	596	23·6	3·60	732	15	5	0	7	M	March 23	36
19	600	26·0	3·60	728	15	3	4	2	M	May 26	33
18	547	26·0	3·20	595	12	7	11	5	S	″ 13	30
28		Average . .		$813\frac{1}{3}$							40 weeks

* Aborted.

FARM K.

No. of cow.	Total milk in galls.	Average milk per day in lbs.	Average per cent of fat	Total milk of 3 % of fat in galls.	Value of the produce at 5d. per gall. £	s.	d.	Age of cow.	Size of cow.	Dates of calving.	No. of weeks in milk.
26	975	35·7	3·70	1205	25	2	1	...	M	April 3 May 23	39 weeks
22	728	19·2	4·79	1168	21	6	8	3	M	Nov. 1	54 "
1	9[illegible]2	30·7	3·70	1139	23	14	7	7	M	" 6	39 "
8	1007	31·9	3·10	1071	22	6	3	6	M	Feb. 2	45 "
30	875	27·7	3·60	1058	22	0	10	6	S	Dec. 20 Nov. 27	45 "
19	967	37·0	3·20	1050	21	17	6	9	M	Dec. 26 Jan. 6	
18	660	24·2	4·40	1015	21	2	11	8	M	April 20	
6	783	20·7	3·80	1002	20	17	6	5	S	Oct. 28	54
10	788	23·4	3·70	957	20	11	3	5	S	Feb. 19	48
13	805	29·3	3·50	965	20	2	1	7	S	Jan. 10 Dec. 28	39
4	748	27·3	3·70	954	19	17	6	6	M	Feb. 6	39
21	729	26·7	3·60	890	18	10	10	3	M	Nov. 1 Aug. 24	39
11	702	23·8	3·80	889	18	10	5	7	M	March 20	42
15	638	23·1	4·00	863	17	19	7	6	M	June 3 " 18	39
28	614	21·3	4·00	853	17	15	5	6	S	March 2	36
27	743	25·3	3·30	834	17	7	6	4	S	" 21 May 24	42
20	689	19·3	3·50	822	17	2	6	4	M	June 1	54
29	642	19·1	3·50	755	15	14	7	3	M	Feb. 13	48
3	698	27·6	3·20	753	15	13	9	7	L	Dec. 27	36
24	680	23·1	3·30	738	15	7	6	8	S	March 20	42
7	544	23·0	3·80	705	14	13	9	7	M	April 5	33
9	568	20·8	3·40	655	13	12	11	4	M	" 7	39
32	508	17·2	3·70	631	13	2	11	3	L	March 18	42
31	528	19·3	3·50	619	12	17	11	4	M	April 14	39
5	502	21·7	3·30	559	11	12	11	3	L	June 10	33
33	431	20·5	3·87	547	11	7	11	.	..	" 20	30
16	402	15·9	4·00	536	11	3	4	3	M	May 20	36
23	433	17·1	3·60	522	10	17	6	3	M	" 23	36
17	455	15·4	3·40	507	10	11	3	3	...	March 29	42
14	349	15·1	3·70	431	8	19	7	3	M	May 30	33
12	417	16·5	2·90	415	8	12	11	3	M	" 10	36
31		Average . .		$821\frac{1}{2}$							$40\frac{3}{7}$ weeks

FARM L.

No. of cow.	Total milk in galls.	Average milk per day in lbs.	Average per cent of fat	Total milk of 3 % of fat in galls.	Value of the produce at 5d. per gall. £	s.	d.	Age of cow.	Size of cow.	Dates of calving.	No. of weeks in milk.
29	1175	32·9	3·30	1313	27	7	1	9	M	Dec. 28	51 weeks
33	860	25·6	4·20	1225	25	10	5	9	L	Jan. 2	48 "
35	1098	34·8	3·10	1139	23	14	7	11	M	March 4	45 "
	864	25·7	3·80	1096	22	16	8	6	L	Nov. 1 " 1	48
20	804	27·3	3·90	1069	22	5	5	15	M	Feb. 12 Jan. 2	42
4	842	28·6	3·70	1037	21	12	1	7	M	Feb. 25	42
31	739	21·9	4·00	985	20	10	5	2	L	" 19 Dec. 27*	48

* Aborted.

FARM L—*continued.*

No. of cow.	Total milk, gals.	Average daily yield, lbs.	Average per cent. of fat	Total milk of [illegible] fat in gals.	Value of the produce at 5d. per gall.			Age of cow.	Size of cow.	Dates of calving.	No. of weeks in milk.
					£	s.					
10	815	28·2	3·60	982	20	9			L	Dec. 20	39 weeks
23	803	23·9	3·50	964	20	1			S	Nov. 20 Oct. 4	48 "
13	811	27·6	3·50	961	20	0	5	8	L	Jan. 16	42 "
26	798	27·1	3·60	957	19	18	9	15	M	Feb. 25	42 "
6	722	24·6	3·90	950	19	15	10	4	M	April 27 May 4	42 "
32	880	24·6	3·20	941	19	12	1	7	L	Jan. 27	51
16	634	17·7	4·50	938	19	10	10	3	L	Dec. 28 " 7	51
22	666	18·6	4·10	931	19	7	11	4	S	Oct. 10 Aug. 19	51
3	780	26·5	3·40	909	18	18	9	8	L	March 14	42
15	706	24·0	3·60	858	17	17	6	10	L	" 21	42
11	752	27·5	3·30	847	17	12	11	4	[illegible]	Feb. 20 Jan. 2	39
18	517	17·6	4·60	810	16	17	6	3	L	March 10	42
9	661	26·2	3·60	808	16	16	8	6	L	" 5	36
2	662	19·8	3·90	803	16	14	1	3	[illegible]	Nov. 3 Oct. 27	45
28	647	22·0	3·70	800	16	13	4	6	L	Feb. 25	12
19	606	24·0	3·80	777	16	3	9	3	M	Oct. 3	36†
8	615	26·6	3·50	729	15	3	9	12	M	March 27	33‡
30	609	22·3	3·50	727	15	2	11	4	S	Jan. 26	39
7	572	22·7	3·60	686	14	5	10	10	L	March 1	36‡
36	423	15·5	4·00	577	12	0	5	4	M	Nov. 20	39
12	417	18·0	3·90	548	17	13	4	2	S	June 2	33
28		Average . .		906							42¼ weeks

FARM M.

No. of cow.	Total milk, gals.	Average daily yield, lbs.	Average per cent. of fat	Total milk of [illegible] fat in gals.	£	s.	d.	Age of cow.	Size of cow.	Dates of calving.	No. of weeks in milk.
29	1022	30·4	3·80	1322	27	10	2	7		Jan. 12	48 weeks
25	876	29·8	3·90	1160	24	3	4	8		April 4 Jan. 10*	39
17	900	27·7	3·40	1123	23	7	11	10	M	" [illegible] Nov. 17	
8	932	26·1	3·40	1081	22	10	5	10	M	" 15 Oct. 23	
7	819	26·0	3·90	1071	22	5	10	4	M	March 7 Nov. 10	
19	934	31·7	3·40	1064	22	3	4	9	M	May 31	
9	925	25·9	3·40	1051	21	19	2	10	M	Nov. 3 " 20	
10	826	30·2	3·60	1018	21	4	2	4	L	May 1	
13	8[illegible]	29·[illegible]	3·70	1016	21	3	4	11	M	March 7	
27	775	20·5	3·90	1009	21	0	5	3	M	Dec. 6 Nov. 10	
22	741	19·6	4·20	1008	21	0	0	3	M	" 1 " 10	
18	868	27·5	3·40	1003	20	17	11	10	M	Jan. 5 " 10	
	803	29·4	3·70	997	20	15	5	10	M	April 8	

Aborted † Cow sold at the period stated.
‡ Ceased giving milk at the period stated.

FARM M—*continued.*

No. of cow.	Total milk in galls.	Average milk per day in lbs.	Average per cent of fat	Total milk of 3 % fat in galls.	Value of the [illegible] at 5d. per gall.			Age of cow.	Size of cow	Dates of calving.	No. of weeks in milk.
					£	s.	d.				
24	794	25·2	3·60	971	20	4	7	4	M	Feb. 8 Jan. 12	45 weeks
23	786	23·3	3·69	968	20	3	4	3	M	Nov. 1 Oct. 9	18 "
11	786	23·4	3·50	938	19	10	10	4	M	Dec. 30 Jan. 1	48 "
15	845	28·7	3·10	900	18	15	0	10	M	March 11 Jan. 1	42 "
14	679	26·9	3·90	889	18	10	5	11	M	April 1	36 "
2	710	22·0	3·50	875	18	4	7	11	M	Oct. 25	48
1	744	23·6	3·40	862	17	19	2	3	L	Dec. 31 " 17	45 "
21	677	17·8	3·80	860	17	18	4	6	M	" 4 Nov. 10	
28	657	17·4	3·80	848	17	13	4	4	M	Dec. 17 Nov. 10	54
12	686	29·7	3·60	827	17	4	7	8	M	April 28	33
26	639	16·8	3·80	816	17	0	0	3	M	Nov. 22 " 10	54
4*	653	25·9	3·60	801	16	13	9	7	M	April 1	33
16	643	18·0	3·50	765	15	18	9	10	M	Sept. 15 Aug. 31	51
5	613	21·3	3·70	763	15	17	11	10	M	April 12	36
20	614	22·4	3·70	759	15	16	3	6	M	March 17	39
3	543	17·2	4·00	724	15	1	8	3	S	Nov. 12	45
29		Average . .		848							45¼ weeks

FARM N.

No. of cow.	Total milk in galls.	Average milk per day in lbs.	Average per cent of fat	Total milk of 3 % fat in galls.	Value of the [illegible] at 5d. per gall.			Age of cow.	Size of cow	Dates of calving.	No. of weeks in milk.
					£	s.	d.				
8	865	29·4	3·40	1005	20	18	9	7	M	March 24 April 20	42 weeks
12	824	30·1	3·50	967	20	2	11	6	L	Jan. 10	39 "
13	738	25·1	3·90	963	20	1	3	5	M	March 28	42 "
24	807	29·4	3·50	954	19	17	6	4	M	" 12	39 "
1	853	23·8	3·30	940	19	11	8	3	M	Oct. 16 " 20	51
7	780	24·7	3·50	916	19	1	8	12	M	Jan. 15	45
15	769	24·4	3·40	889	18	11	3	4	M	March 8	45
16	755	23·9	3·40	870	18	2	6	6	M	" 18	45
4	650	20·6	3·80	829	17	5	5	3	M	Oct. 16	45
2[illegible]	659	22·4	3·70	818	17	0	10	7	M	April 1 March 20	42
19	717	26·2	3·30	797	16	12	1	5	M	" 1	39
11	635	20·1	3·70	788	16	8	4	5	S	" 21, 1904 Dec. 1, 1905	45
21	687	21·8	3·40	784	16	6	8	5	M	" 1[illegible] Nov. 23	45
14	666	22·6	3·50	782	16	5	10	4	L	June 18 Oct. 4	
2	652	23·9	3·40	755	15	14	7	3	M	20	
18	617	20·9	3·60	750	15	12	6	3		Dec. 10	42
25	624	27·0	3·50	746	15	10	10	16	M	June 1	
5	644	20·4	3·40	745	15	10	5	10	L	March 25, 1904 Nov. 27, 1905	

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* Aborted.

FARM N—*continued.*

No. of cow.	Total milk in galls.	Average yield per day in lbs.	Average per cent. of fat	Total milk of 3 % of fat in galls.	Value of the produce at 5d. per gall. £	s.	d.	Age	Size of	Dates of calving.	No. of weeks in milk.
9	636	23·3	3·40	733	15	5	5	6	L	March 23	39 weeks
10	587	23·3	3·70	725	15	2	1	6	L	" 12	36 "
17	522	17·7	4·10	718	14	19	2	3	S	Dec. 10	42 "
22	600	23·8	3·50	716	14	18	4	5	M	March 10	36 "
6	536	23·2	3·60	656	13	13	4	6	L	Feb. 12	33 "
3	400	17·3	3·60	488	10	3	4	3	M	Oct 16	33 "
24		Average . .		805½							41 weeks

FARM O.

24	628	23·0	4·30	902	18	15	10		M	April 14	39 weeks
9	724	24·6	3·60	873	18	3	9		S	Feb. 15	42 "
22	759	27·7	3·40	870	18	2	6	7	M	April 8	39 "
5	804	29·4	3·20	865	18	0	5	6	M	Feb. 23	39 "
2	594	21·7	4·20	838	17	9	2	4	M	March 16 Jan. 13*	39 "
23	610	22·3	3·90	808	16	16	8			April 8	39 "
3	620	18·4	3·70	770	16	0	10	4		Feb. 28 Oct. 20*	48 "
1	549	18·6	4·00	732	15	5	0	5	M	March 20	42 "
19	509	20·2	4·30	726	15	2	6	3	M	April 18	36 "
7	567	20·7	3·60	684	14	5	0	8	S	" 1	39 "
10	512	17·4	3·90	677	14	2	1	4	S	March 25	42 "
21	472	17·3	4·10	657	13	13	9	10	S	" 8	39 "
14	539	19·7	3·60	656	13	13	4	8	M	April 5	39 "
6	451	21·5	4·10	628	13	1	8	2	S	" 22	30 "
13	554	20·3	3·30	617	12	17	1	8	L	Feb. 28	39 "
17	512	18·7	3·50	600	12	10	0	4	S	Jan. 18	39 "
15	421	16·7	3·90	553	11	10	5	3	M	April 28	36 "
20	438	20·8	3·70	546	11	7		4	M	" 16	30 "
4	482	17·6	3·30	537	11	3	9		M	March 21	39 "
25	390	16·8	3·80	501	10	8	9		S	May	33 "
11	322	15·3	3·90	422	8	15	10		S	April 1	30 "
18	301	13·0	3·70	379	7	19	4	5	M	" 26	33 "
12	190	10·00	3·60	228	4	15	0	2			27 "
23		Average . .		655							37¼ weeks

FARM R.

17	1149	36·4	3·15	1208	25	3	4	8	L	Jan. 17	45 weeks
26	810	25·7	4·00	1092	22	15	0	4	M	Oct. 28 Jan. 4	45 "
4	878	24·5	3·70	1087	22	12	11	20	M	" 15	51 "
7	817	25·9	3·70	1012	21	1	8	3	S	Sept. 20 Nov. 10	45 "
19	773	28·3	3·70	961	20	0	5	7	M	April 3	39
3	680	24·9	4·00	915	19	1	3	7	M	" 6	39
24	757	30·0	3·50	894	18	12	6	4	L	" 12	36
15	648	28·0	3·70	832	17	6	8	5	M	May 1	33
5	702	25·7	3·40	805	16	15	5	5	M	April 2	39

* Aborted.

FARM R—*continued.*

No. of cow.	Total milk in galls.	Average milk per day in lbs.	Average per cent. of fat	Total milk of 3% of fat in galls.	Value of the produce at 5d. per gall. £	s.	d.	Age of cow.	Size of cow.	Dates of calving.	No. of weeks in milk.
11	656	22·3	3·50	781	16	5	5	4	M	Feb. 20	42 weeks
20	647	25·6	3 50	773	16	2	1	8	M	April 19	36 "
6	588	20·0	3·80	766	15	19	2	3	S	May 19 June 2	42 "
25	591	20·1	3·70	737	15	7	1	3	M	Oct. 12 Nov. 26	42 "
2	711	26·0	3·00	732	15	5	0	5	M	April 19	39 "
16	639	27·7	3·20	702	14	12	6	8	M	May 13	33 "
12	503	18·4	3·90	662	13	15	10	3	M	March 30	39 "
9	592	20·1	3·30	655	13	12	11	3	S	Feb. 27	42 "
21	522	24 8	3·50	617	12	17	1	7	M	June 4	30 "
22	480	25·4	3·80	615	12	16	3	12	M	" 10	27 "
27	393	15 6	4·20	558	11	12	6	3	M	May 14	36 "
28	388	15·9	3·90	514	10	14	2	3	S	" 31	33 "
23	429	20·4	3·40	493	10	5	5	3	S	June 10	30 "
22		Average . .		791½							38¼ weeks

FARM S.

No. of cow.	Total milk in galls.	Average milk per day in lbs.	Average per cent. of fat	Total milk of 3% of fat in galls.	Value of the produce at 5d. per gall. £	s.	d.	Age of cow.	Size of cow.	Dates of calving.	No. of weeks in milk.
10	871	27·6	4·30	1268	26	8	4	9	M	Oct. 22 " 4*	45 weeks
22	878	27·8	4·20	1233	25	13	9	3		20 " 20	45
23	816	32·4	4·00	1099	22	17	11	6		April 12	36
8	905	30·8	3·40	1051	21	17	11	6		Sept. 16 Aug. 27	42
31	776	20·5	3·80	1006	20	19	2	2		Sept. Aug. 15*	54
24	833	24·8	3·50	987	20	11	3	8		March 3	48
1	671	22·7	4·30	948	19	15	0	3		Aug. 15 Nov. 1	42
25	625	19·8	4·30	911	18	19	7	3	M	" Oct. 29	45
33	771	26·2	3·50	909	18	18	9	2	S	" Nov. 7	42
	652	22·1	4·50	907	18	17	11	7	M	Oct. 20	42
28	594	23·6	4·50	903	18	16	3	4	L	Aug. 16 Dec. 9	36
19	799	27·1	3·30	900	18	15	0	5	M	March 18	42
3	796	29·0	3·30	898	18	14	2	6		Aug. 22 " 21	39
12	698	19 5	3·70	870	18	2	6	5		Feb. 8	51
18	769	26 2	3·30	849	17	13	-	-		April 18	
20	677	24·8	3·70	841	17	10	5	6		" 15	
14	653	22·2	3·80	837	17	8	9	5		19	42
13	662	24·2	3·50		16	15	10	4		May 1	39
	633	25·1	3·70	800	16	13	4	4		Nov. 1 Oct. 18	
26	678	24·8	3·40	780	16	5	0	6		May 5	39
6	737	29·2	3·10	777	16	3	9	10		Feb. 5	36
5	595	21·8	3·50	710	14	15	10	3		Dec. 16	39
2	582	19·8	3·60	699	14	11	3	3		Oct 20	42
27	531	25·3	3 70	656	13	13	4	3		Nov. 27	30
30	458	15·5	3·90	597	12	8	9	2		April 15	42
21	544	19 9	3·20	584	12	3	4			" 20	39
26		Average . .		878							41¼ weeks

* Aborted.

FARM T.

No. of cow.	Total milk in gallons.	Average daily yield in lbs.	Average per cent. of fat	Total milk of 4 per cent. of fat in galls.	Value of the produce at 5d. per gall.			Age of cow.	Size of cow.	Dates of calving.	No. of weeks in milk.
					£	s.	d.				
28	1072	31·9	3·20	1144	23	16	8	8	L	March 1	48 weeks
11	905	25·3	3·60	1115	23	4	7	8	L	Oct. 20 " 1	51 "
21	843	24·6	3·80	1088	22	13	4	3	L	Feb. 10	51 "
1	897	28·5	3·60	1077	22	8	9	7	L	March 26	45 "
5	941	29·8	3·40	1069	22	5	5	4	L	Dec. 24 Nov. 19	45 "
25	871	24·4	3·60	1056	22	0	0	4	S	" 23 Dec. 1	51 "
2	841	25·0	3·70	1043	21	14	7	8	L	March 8	48 "
15	932	31·7	3·20	1015	21	2	11	8	L	" 8	42 "
6	840	28·5	3·60	1013	21	2	1	7	S	Feb. 1	42 "
22	787	24·9	3·70	984	20	10	0	5	L	Nov. 26 " 12	45 "
27	764	25·8	3·70	955	19	17	11	5	M	March 5	42 "
23	765	20·2	3·60	941	19	12	1	4	S	Nov. 5	54 "
29	705	23·9	3·80	913	19	0	5	11	L	Feb. 22 Jan. 17*	42 "
32	707	22·4	3·80	912	19	0	0	6	M	Feb. 10	45 "
8	752	29·8	3·60	911	18	19	7	8	L	May 5	36 "
9	682	24·9	3·80	863	17	19	7	8	L	Oct. 10 Nov. 1	39 "
19	647	20·5	3·90	837	17	8	9	4	M	Oct. 25	45 "
18	696	20·7	3·50	810	16	17	6	3	M	March 5	48 "
4	620	19·7	3·80	799	16	12	11	4	M	Feb. 10	45 "
14	542	19·8	4·30	783	16	6	3	9	M	Nov. 8 " 10	39 "
16	696	27·6	3·30	779	16	4	7	10	L	May 27	36 "
3	692	21·9	3·40	779	16	4	7	7	M	Dec. 20	45 "
13	577	22·9	4·00	771	16	1	3	6	S	Oct. 27 Sept. 11	36 "
10	584	23·2	3·70	718	14	19	2	5	L	Oct. 20 Nov. 19	36 "
36	635	27·4	3·30	699	14	11	3	8	M	June 18	33 "
34	595	23·6	3·20	646	13	9	2	4	L	March 4	36 "
31	643	21·8	2·80	627	13	1	3	6	M	Feb. 28	42 "
30	491	26·0	3·60	592	12	1	8	11	L	March 15	27 "
26	479	19·0	3·70	590	12	0	10	3	M	Jan. 8	36 "
33	462	20·0	3·50	547	11	2	11	3	S	Feb. 12	33 "
12	508	18·5	3·20	546	11	2	6	5	M	March 8	39 "
35	403	19·2	3·60	494	10	5	10	6	S	May 1	30 "
32		Average .	.	844½							41½ weeks

* Aborted.

THE COMPOSITION OF TURNIPS AND SWEDES.

By JAMES HENDRICK, B.Sc., F.I.C., Chemist to the Society.

DURING recent years a considerable amount of investigation into the composition of different kinds of turnips, and into the variations in the composition of turnips, has been made in this country. It is well known that the sugar-beet has been very greatly improved in composition during the last thirty or forty years by selection of roots as seed-mothers by chemical analysis. The sugar content of average beet was increased about 50 per cent in the course of twenty to twenty-five years by systematic selection by this method. At the same time, analyses show that turnips and swedes are much the same in composition now as they were sixty years ago. They have not been improved at all in percentage of dry matter or of sugar by all the selection of seed which has taken place during that period. Sugar-beets were at first selected for seed by their shape and appearance. During this period little improvement in their composition was effected. Later selection was made according to the specific gravity of the roots, then according to the specific gravity of the juice, but these methods were soon replaced by selection according to the percentage of sugar and of other solids in the juice. It was only when this final method of selection by actual determination of the sugar and of what is known as the quotient of purity was adopted that rapid advance was made.

It is a long time since it was first suggested that improvement in the composition of turnips might be effected by similar methods. My predecessor, Dr Anderson, in an address to this Society in 1855,[1] reported on attempts which were being made by the then Marquess of Tweeddale to improve turnips in quality by selecting those of highest specific gravity as seed-mothers. Dr Anderson writes: "Their principle consists in selecting the turnips of highest specific gravity, which are then planted out for seed, and the seed saved from them is found to produce turnips of specific gravity above the average. From this crop the specifically heaviest bulbs are again selected, and their produce is treated in the same manner, and thus, after several years, a crop is obtained materially higher in specific gravity than that with which the experiments started. The question which remained for determination was whether an increase in specific gravity indicated an increase in nutritive value." Dr Anderson investigated the composition of a number of these turnips, and gives his results. It is not stated how long the experiments had been in progress, but the results given do not show that much improvement had been effected. The conclusion drawn by Dr Anderson is that specific gravity of the turnip is a very uncertain test, and indicates the presence in the bulb of more or less air rather than excellency of composition. This conclusion has since been confirmed by others, both for turnips and for other root crops. Dr Anderson recommends that the specific gravity of the juice, rather than that of the turnip, be taken as a measure of quality. He says: "In short, the general conclusion is that the specific gravity of the juice gives a more accurate estimate of the value of the turnip than that of the whole root." We are not informed how these experiments ended. But they do not appear to have had any great effect on commercial methods of selecting turnips for seed.

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[1] 'Transactions of the Highland and Agricultural Society of Scotland,' 1855-1857, p. 174, "On Specific Gravity as a Character for Determining the Value of Different Crops."

The late chemist of this Society, Dr Aitken, made a series of experiments, which extended over a period of years, in which he endeavoured to improve turnips by the chemical selection of seed-mothers, but the results do not appear to have been published, and the experiments were never carried to a definite conclusion.

With mangels the case is similar. They, like turnips, are very much the same in composition to-day as they were fifty or sixty years ago. It has naturally suggested itself to many that what has been done for the sugar-beet might also be done for the turnip and mangel, but so far no extensive attempt has been made by seedsmen to select seed-mothers for these roots by composition.

Within recent years several of the agricultural departments of universities and agricultural colleges have turned their attention to this important subject, and a number of reports on the composition and variation in composition of root crops have been published by their chemists. A main object of these investigations has been to prepare the way for systematic work on the improvement of roots by chemical selection of seed-mothers. In this paper it is proposed to give an account of such work, especially of that carried out by Mr T. B. Wood, of the Department of Agriculture, University of Cambridge; Mr S. H. Collins, of the Agricultural Department, Armstrong College, Newcastle-on-Tyne; and by the writer, under the Aberdeen and North of Scotland College of Agriculture. Part of this work has been described in recent reports of these institutions, but important papers have also appeared elsewhere.[1]

The influence of variety on the composition of roots has been investigated by all these writers, and all of them have shown that there are considerable differences of composition among well-known varieties. Collins finds from the average of a great many determinations of many different varieties of swedes grown during five years, 1900-1904, that the average swede of the north of England contains 12·39 per cent of dry matter. This average is departed from considerably on different farms and in different years. Thus at Cockle Park the following averages were found:—

TABLE I.—SWEDES AT COCKLE PARK.

Year.	Dry Matter.
1900	11·43 per cent.
1901	10·32 „
1902	11·93 „
1903	11·67 „
1904	
Average for five years	

He places his varieties in the following order of merit, according to their percentage of dry matter:—

TABLE II.—ORDER OF DRY MATTER. SWEDES GROWN IN NORTH OF ENGLAND.

Fell's Bronze Top	Exceeded average 0·7
Webb's Imperial	„ „ 0·3
Carter's Prize Winner	„ „ 0·2
„ Holborn Elephant	
„ „ Kangaroo	
Drummond's Stirling Castle	
Webb's New Arctic	
Drummond's Extra Improved Purple Top	„ „ 0·1
Fell's Halewood Bronze Top	Average
Tait's Best of All	Less than average 0·3
Kent & Brydon's Darlington Bronze Top	
Sutton's Crimson King	
Kent & Brydon's XL All	„ „ 0·6
Garton's Model Bronze Top	„ „ 0·8

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[1] "Variations in the Chemical Composition of the Swede," by S. H. Collins, 'Journal of Agricultural Science,' vol. i. p. 89. "Variation in the Chemical Composition of Mangels," by T. B. Wood and R. A. Berry, 'Journal of Agricultural Science,' vol. i. p. 176.

The author obtained similar results for yellow turnips and swedes grown in the north-east of Scotland during the year 1903. The results are shown in the following table:—

TABLE III.—DRY MATTER IN TURNIPS—NORTH-EAST OF SCOTLAND.

AVERAGE OF SEVEN FARMS.

Variety.	Per cent of Dry Matter.
YELLOW TURNIPS.	
Oldmeldrum	9·56
Challenger	9·38
Sittyton Purple Top	8·91
Webb's Invincible	8·71
Centenary	7·28
Average of all Yellows	8·77
SWEDES.	
Kinaldie Green Top	10·92
Smith's Purple Top	10·57
Fell's Bronze Top	10·38
Webb's Imperial	10·24
Inverquhomery	10·09
Tait's Best of All	9·84
Drummond's Extra Improved	9·76
Average of all Swedes	10·26

The averages for the north-east of Scotland are lower than those of the north of England, but so far as the same varieties of swedes occur in the two lists the order of merit is very similar. The swedes are, as is usual, considerably better on the average than the yellows, but on several farms the best varieties of yellows were higher in dry matter than the worst varieties of swedes. It has been found also by different investigators that the average for different farms varies considerably, and as shown above (Table I.) the average varies very much from season to season. The influence of manuring and of size of bulbs has also been investigated and has been shown to be considerable.

Variation of Different Parts of the Same Bulb.

A turnip or mangel bulb is not uniform in composition. A piece taken from the outside is quite different from a piece taken from the core, and a slice off the top is different from a slice off the bottom. This point is thoroughly dealt with for mangels by Wood and Berry in the paper already mentioned. The author has investigated to some extent the same question in the case of yellow turnips. The following diagram (fig. 28) illustrates the variation in dry matter which was found in the case of two individual bulbs, *a* and *b*, from the same field. Both bulbs were hard and sound all through. Each bulb was first cut into six horizontal slices, and the slices were then divided up as shown in the diagram.

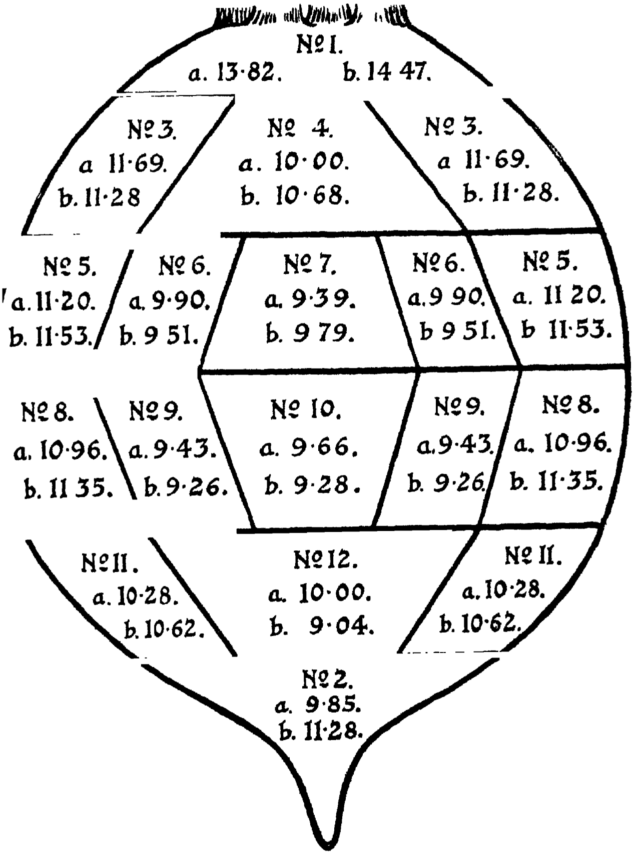

Fig. 28.—*Green-Top Yellow Turnips.*

Weight—*a*, 4 lb. 2 oz.; *b*, 4 lb. 4 oz.
Mean—*a*, 10·51 per cent dry matter; *b*, 10·65 per cent dry matter

The top and bottom slices, Nos. 1 and 2, were not further subdivided. No. 3 represents a ring round the second slice, and No. 4 the central portion of the slice. Similarly No. 5 represents the outside ring of the third slice, No. 6 a ring inside that, and No. 7 the central portion of the slice. Similarly with the 4th and 5th slices. In this way each turnip was divided into twelve different portions from top to tail and from rind to core. The figures in the diagram represent the percentages of dry matter found in these portions.

We may summarise the results shown in this diagram as follows:—

1. The upper half of a turnip contains a higher percentage of dry matter than the under half.

2. The outside part is richer in dry matter than the inside part. As we proceed from the outside towards the centre, the percentage of dry matter falls. Generally speaking this is true, no matter from what direction we proceed, but the difference from crown to centre is greater than the difference found in any other direction.

These results were confirmed by determinations made in other roots of two different varieties. All the turnips on which determinations were made were sound, hard roots. Probably these results would not hold with "foggy" or "corky" turnips.

Method of Sampling.

The above results show that in order to obtain a really fair sample of a turnip the whole bulb would require to be taken. A very nearly fair sample can be obtained by taking a wedge or sector from top to bottom through the bulb. This sector method has often been employed, but it is out of the question in selecting turnips for seed, as it would destroy the turnip. In the case of sugar-beets the samples are obtained by making a cylindrical boring through the beet. Recent workers have adopted the same method in dealing with turnips and mangels: a boring instrument is driven through the turnip either diagonally as at A B in fig. 29 or horizontally as at C D, and a cylindrical sample of the root is withdrawn. Boring such a hole through the bulb does not destroy it for seed-

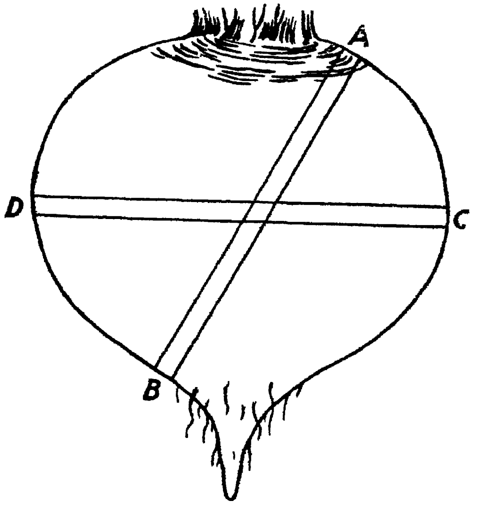

Fig. 29.—*Method of Sampling Turnips.*

bearing purposes if it is properly taken care of after being bored. All the author's samples have been drawn by taking diagonal borings from a point, A. near the outside of the leaf scars to a corresponding point near the tail of the turnip. Such a boring does not give a truly average sample of the bulb, but only an approximately average sample. So long, however, as the borings are all drawn in the same way the results will be comparable, and the bulbs which are the best can be selected.

In the work referred to already upon the composition of different varieties of turnips, the sample of each variety consisted of at least 100 borings drawn from different bulbs taken, in the case of the writer's work, just as they came along the drill. A common method in taking samples is to select what appear to be average bulbs from the field or from a heap. This is not an accurate method even when a large number of bulbs is selected, as the tendency is to select bulbs above the average in size. The average bulb of an ordinary crop of turnips is seldom much above 2 lb. in weight and is often below 2 lb. But when selecting by the eye the tendency is to pick out bulbs above this weight. The writer's method of drawing a representative sample is to take every bulb large or small just as it comes and take a boring from it.

Variation of Individual Bulbs.

Individual bulbs of the same variety, grown from the same sample of seed alongside one another on the same land, under the same conditions of soil, manuring, and treatment, exhibit very great differences in composition. It has long been held that large bulbs are poorer in composition than smaller bulbs; and, generally speaking, this is true. It is only true in a very general sense, however, and it is quite common to find large bulbs of good composition and small bulbs of poor composition. In fact, both large and small bulbs exhibit very great individual variations. This has been well illustrated in the case of mangels by Mr Wood in the paper already referred to.

In order to find out how far the same thing holds for turnips, the writer obtained 100 bulbs, which were taken just as they came in the drill, large and small, well shaped and badly shaped all together. The bulbs were weighed and their dry matter determined, and the results are shown in the following table, in which 97 roots are arranged in order of the dry matter which they contained. The average weight and the average dry matter are also shown for each ten.

TABLE IV.—WEIGHTS AND PERCENTAGES OF DRY MATTER OF 97 TURNIPS OF SAME VARIETY FROM SAME DRILL.

No.	Weight of Turnips			Percentage of Dry Matter.	
	lb	oz	Average of Ten		Average of Ten.
1	0	10	16 oz.	19·8	11·4
2	0	11¼		17·6	
3	1	12¼		15·1	
4	1	3		14·9	
5	0	10		13·2	
6	0	9		13·2	
7	1	8¾		13·0	
8	1	1		12·8	
9	1	6		12·4	
10	0	7		12·3	
11	1	0¾	21·4 oz.	12·1	11·7
12	1	3		12·0	
13	1	14¼		12·0	
14	1	10½		11·8	
15	1	3¾		11·8	
16	0	15¾		11·7	
17	0	13¼		11·6	
18	1	0¼		11·5	
19	1	7		11·4	
20	2	1½		11·4	
21	2	14	26·25 oz.	11·4	11·3
22	1	8½		11·4	
23	1	12¼		11·3	
24	0	9¼		11·3	
25	0	12¼		11·3	
26	1	2½		11·2	
27	1	5		11·2	
28	1	8½		11·2	
29	1	12		11·2	
30	3	1¾		11·2	
31	2	4	32·7 oz.	11·2	11·0
32	0	12		11·1	
33	2	7¾		11·1	
34	3	2½		11·0	
35	2	6½		11·0	
36	3	3		11·0	
37	2	8¼		11·0	
38	2	0		10·9	
39	0	9		10·9	
40	1	1½		10·9	
41	1	7¾	28·7 oz.	10·9	10·8
42	6	6¼		10·9	
43	0	11¾		10·9	
44	1	13½		10·9	
45	2	1¼		10·8	
46	1	1¾		10·8	
47	1	14½		10·8	
48	0	14½		10·8	
49				10·7	
50	1	7½		10·7	
51	1	0¾	30·75 oz.	10·6	10·5
52	1	2¼		10·6	
53	4	1¾		10·6	
54	2	4½		10·5	
55	0	8		10·5	
56	0	8¼		10·5	
57	0	15¼		10·5	
58	1	4¼		10·5	
59	2	4¼		10·5	
60	5	2¼		10·5	
61	0	8	27·1 oz.	10·4	10·3
62	0	12¼		10·4	
63	1	5½		10·4	
64	1	10¼		10·4	
65	1	4½		10·3	
66	2	10¾		10·2	
67	2	13¾		10·2	
68	2	7		10·2	
69	2	8		10·2	
70	0	14½		10·1	
71	2	10½	38·1 oz.	10·0	9·8
72	2	11¼		10·0	
73	4	12¾		10·0	
74	1	10½		9·9	
75	3	5¼		9·9	
76	1	1½		9·8	
77	2	9		9·7	
78	2	3¾		9·7	
79	1	5		9·7	
80	1	6½		9·6	
81	1	11¾	29·3 oz.	9·6	9·4
82	0	13¼		9·6	
83	1	3		9·5	
84	3	12		9·5	
85	2	4		9·5	
86	3	7		9·4	
87	0	9¾		9·4	
88	1	10¼		9·4	
89	1	5¼		9·3	
90	1	8¼		9·2	
91	2	12	37·7 oz.	9·0	8·8
92	1	7		9·0	
93	3	9		9·0	
94	3	0½		8·9	
95	2	7½		8·8	
96	2	1½		8·8	
97	1	0½		8·1	

Average weight of all, 28·65 oz. Average dry matter in all, 10·84 per cent.

The table shows that the dry matter varies from 19·8 per cent to 8·1 per cent; or if we leave out the three exceptional individuals, 1, 2, and 97, from 15·1 per cent to 8·8 per cent. A study of the table will show that the size bears only the roughest relation to the percentage of dry matter. This relation, so far as it exists, is brought out by the averages of consecutive tens given in the table. For the first four tens the average weight rises as the dry matter falls. After that the relation is irregular, and the maximum weight is reached in the eighth ten.

The average weight of all the bulbs is considerably under 2 lb., although the field from which they were obtained bore what was considered to be a good crop. The average dry matter of the whole shows that these roots were of good quality for yellow turnips. They were all found to be firm, sound, and free from fogginess.

If, instead of arranging the bulbs in order according to the percentage of dry matter, as is done in Table IV., we take them in the random order in which they occur in the drill, and take averages of their dry matter by tens, by twenties, and by fifties, we get the results shown in the following table:—

TABLE V.—Dry Matter in sets of Turnips taken as they occur in the Drill.

	Taken in tens. per cent.		Taken in twenties. per cent.		per cent.
1st . . .	11·00		11·03	1st 49 . .	10·70
2nd	11·06				
3rd	10·70		10·59		
4th	10·48				
5th	10·41		11·32		
6th	12·23			Remaining 48	11·06
7th	11·10		10·81		
8th	10·51				
9th	10·65	Last 17	10·60		
Last 7	10·50				
Mean . .	10·83		10·84		10·88
Greatest variations	+1·35		+0·44		+0·18
Pure mean . .	−0·47		−0·29		−0·18

This table clearly illustrates the astonishing differences in average percentage of dry matter which may be found between different lots of roots when only ten or twenty, and even when fifty bulbs, are taken for analysis. When only ten bulbs are taken two consecutive lots, the fifth and sixth, differ by 1·82 per cent, or over one-sixth of the total average dry matter. When twenties are taken the difference is 0·73 per cent between the second and third lots.

The same thing has been even more strongly and completely illustrated by Mr Wood in the case of mangels,[1] of which he analysed many hundred samples. He showed that the averages of tens may differ by about 2 per cent and commonly differ by over 1 per cent; that averages of twenties may differ 1 per cent and often differ 0·5 per cent, and that even averages of fifties may differ nearly 0·5 per cent.

We conclude, then, that it is impossible to get a trustworthy sample of a crop of turnips by taking ten or twenty or even fifty individual bulbs. The individual differences are so great and so erratic that, in order to get a fair sample of the crop, at least 100 bulbs must be taken, and either sectors or borings taken from each.

Very many of the older recorded analyses of turnips, swedes, and mangels are quite unreliable, except as representing the composition of the actual bulbs taken, on account of the small number of bulbs chosen for analysis. Much of the older experimental work on such subjects as the composition and feeding value of different kinds of turnips and the effects of manures on these, and many feeding experiments in which roots were largely used as food, are rendered unsatisfactory and inconclusive because the samples of turnips taken for analysis consisted of only a small number of bulbs. In such cases the differences between two different samples of the same turnips would probably have been as great as those found between different varieties, or between differently manured crops, or crops from different soils. The results of all experiments which depend on analyses of turnips should be received with great caution unless it is clearly stated that the analytical results were obtained from samples drawn from a large number—say, at least, 100 bulbs.

The great differences in quality which have been shown to exist among roots of the same kind indicate that it should be possible to select as seed-mothers roots with a high percentage of dry matter without sacrificing other desirable qualities such as size and shape. From the 97 roots in Table IV., if we reject all those with less than the average amount of dry matter we have still 44 left. Of these 13 are above the average in size. If we were selecting roots for seed we would first reject all the undersized and badly shaped ones, we would bore the rest and determine the dry matter, and select from these as seed-mothers those with a high percentage of dry matter. If this process is continued over a period of years we may expect eventually to obtain a strain of good size and shape with a greatly improved percentage of dry matter.

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[1] "Selection of Seed by Chemical Methods," by T. B. Wood and R. A. Berry, 'Proceedings of the Cambridge Philosophical Society,' vol. xii. p. 102.

Desirable Qualities for Seed-mothers.

Hitherto only the percentage of dry matter in the roots has been considered, but the dry matter is composed of various substances, some of which are more valuable than others, and if we merely increase the dry matter without considering its composition and value we may not really improve the roots as food. It is necessary to consider, then, what particular qualities we wish to improve in turnips in order to increase their feeding value.

In the case of the sugar-beet, which is our model of a root-crop which has been improved by chemical selection, it was sugar that was wanted. The roots were not selected for general feeding value, but for high percentage of sugar. It was also important in connection with the manufacture and purification of the sugar that the juice of the beet should not contain substances other than sugar, except to a small extent. The roots were therefore also selected for a high ratio of sugar to non-sugar in the juice. This ratio is known as the quotient of purity.

There is little exact information as to the feeding value of the different constituents of turnips. There is some evidence that the feeding value varies in a general way according to the percentage of dry matter. The high percentage of water in turnips is from several points of view a disadvantage, and if it could, within reasonable limits, be diminished, it would cause saving in food, in manure, and in labour. In any case, it seems reasonable to assume that if the percentage of dry matter can be increased without lowering its quality, it will be an advantage.

The further question is more difficult. How are we, without making a complete analysis, to test the quality of the dry matter so as to ensure that, while attempting to increase the quantity, we are not lowering the quality? To make a complete analysis is impracticable, both because it is too laborious and because the sample on which the analysis must be made is too small. If turnips are to be improved by the selection of seed-mothers by analysis, the tests used must be simple and easily carried out, for thousands of bulbs will require to be tested in a short space of time.

It has been proposed that, in addition to the dry matter, the sugar should be determined. This test is not a satisfactory one. Though sugar is an important constituent of the turnip, it is not the only one, and we do not wish to improve the turnip merely as a sugar crop, like the beet, but as a feeding crop for cattle. Further, it is difficult to make a rapid and accurate estimate of sugar in a small sample of turnip.

The greater part of the dry matter of turnips, including all the sugar, is in solution in the juice. This soluble dry matter is easily digestible. On the other hand, a certain proportion of the dry matter consists of insoluble fibrous material, which is more difficult to digest. The amount of this insoluble material varies considerably in different bulbs. In extreme cases we have dry, corky roots, which consist largely of soft, spongy tissue. Such bulbs, which are commonly called "foggy" or "fozy," are especially common among certain varieties of yellows. They are always held to be of low feeding quality as compared with hard, solid, juicy turnips. Though the percentage of dry matter which they contain is sometimes high, it is of poor quality. In extreme cases they contain very little juice, and the juice which they do contain shows a very low percentage of sugar and other nutritious constituents.

When a turnip is very foggy it is easily detected, even without boring, by its lightness and by its hollow sound when tapped. To a certain extent, therefore, fogginess is at present excluded in selecting turnips for seed, for growers endeavour to select hard, heavy turnips as seed-mothers. But such a method of selection is very imperfect, for, even with experience, it is difficult to detect foggy roots without cutting or boring them. For several years past the Royal Northern Agricultural Society has at its spring show offered special prizes for the turnips and swedes containing the highest percentages of dry matter. These classes have been judged by me by taking borings from all the roots shown and determining the dry matter. Most of these roots are also judged, without being cut, in the ordinary classes. Generally speaking, such show roots are above the average in size, symmetry, and appearance; but I find that they are, generally speaking, below the average in percentage of dry matter, and worse than the average in fogginess. Also many roots which were held by practical judges to be hard, sound roots, and were highly placed in the ordinary classes, were, when bored, found to be foggy. My experience in judging show roots convinces me that fogginess cannot with any certainty be detected unless the root is bored.

Foggy roots contain a great deal of air in their tissues, and their specific gravity is therefore low (Table VI.). The foggy tissue consists of wizened dried-up cells, which, like the cells of cork, contain little or no cell contents, but consist of insoluble cell-walls, with comparatively large spaces between them filled with air. Such roots can therefore to a certain extent be detected by their specific gravity. As has been already pointed out in this paper, the then Marquess of Tweeddale endeavoured to select swedes by this method over fifty years ago, and the same method was for a time used in the selection of sugar-beets. It was shown, however, to be an inaccurate method of measuring the quality of roots, and was long ago given up, though it is said that it has recently been reintroduced by certain seedsmen who are endeavouring to produce improved strains of turnips and mangels.

In my work I have rejected both the determination of sugar and of specific gravity, and have endeavoured to devise a method of determining the ratio of soluble to insoluble matters in the solid matters of the root. This, together with the total dry matter, should give us more information as to the feeding quality of the root than any other method yet suggested, involving only one or two determinations. It will enable us to distinguish slight degrees of fogginess not easily detected by the eye in a boring, and, generally speaking, to distinguish fibrous roots, or those high in insoluble constituents, from those which, on the other hand, are not high in insoluble constituents, but are rich in soluble matters.

Method of Selection.

In order to select turnips in this way, the following method has been devised. The boring taken from the bulb is split lengthwise into two portions. In one of these the total dry matter is determined. The juice is expressed from the other by a small, strong screw-press, and the dry matter in it also is determined. These data give us the means of distinguishing between two roots which contain equal percentages of dry matter, but one of which has more fibrous insoluble dry matter than the other. This is the method by which the writer is at present attempting to select seed-mothers in turnips and swedes in experiments which he is carrying out along with Mr R. B. Greig, Fordyce Lecturer in Agriculture in the University of Aberdeen.

The method can be carried out with considerable rapidity. Determinations were made in several hundred bulbs this winter in a comparatively short space of time, and with crude and imperfect apparatus. With increased experience many improvements will be made in details which will greatly add to the rapidity and ease of manipulation of the method.

Possibly a determination of the specific gravity of the juice may replace the determination of its dry matter. At present there are difficulties in determining the gravity rapidly and accurately in so small a sample as one obtains from the boring of a single root. Methods could, no doubt, be devised for getting over these difficulties, and the writer hopes to investigate this matter further.

In order to test the method, a number of roots were obtained from a field of green-top yellow bullock turnips, in which it was known that there were many foggy roots. The turnips had been well manured, and were held to be a good crop for the season, 1904. In 1904 turnips were exceptionally foggy everywhere around Aberdeen. The results of some experiments made with these roots are recorded in Table VI. All the work of this set of experiments was carried out for me by Mr David Milne, B.Sc., now of the Corporation of Western Egypt, Ltd., Egypt.

TABLE VI.—SPECIFIC GRAVITY, MOISTURE, AND RATIO OF SOLUBLE TO INSOLUBLE SOLIDS IN SOUND AND FOGGY YELLOW TURNIPS.

	No of bulb.	Weight.	Specific gravity	Moisture in bulb per cent.	Solids in sap per cent.	Soluble solids in bulb per cent.	Insoluble solids in bulb per cent	Ratio: Soluble Insoluble
Sound Turnips.	1	4 8¼	0·906	92·15	6·61	6·52	1·33	4·9
	4	5 1	0·913	91·44	6·28	6·13	2·43	2·5
	5	5 3	0·912	91·00	6·67	6·50	2·50	2·6
	11	3 11¼	0·968	89·70	8·19	8·01	2·29	3·5
	14	4 6½	0·953	91·33	7·57	7·48	1·19	6·3
	Average	4 [illegible]	0 930	91·12	7 06	6·93	1·95	4·0
Intermediate Turnips.	3	5 5	0·820	90·70	6·65	6·46	2·84	2·3
	6	4 7	0·896	92·33	6·08	5·98	1·69	3 5
	8	4 14	0·850	91·11	7·29	7·17	1·72	4 2
	10	4 1¼	0·874	91·23	6·31	6·15	2·62	2·3
	12	3 15	0·887	90·85	6·27	6·08	3·07	1·9
	Average	4 8½	0·865	91·24	6·52	6·37	2·19	2 8
Foggy Turnips.	2	3 9	0·739	89·98	6·21	5·96	4·06	1·5
	7	3 15	0·808	90·79	6·28	6·09	3·12	1·9
	9	5 6¼	0·785	91·09	5·97	5·78	3·13	1·8
	13	3 7½	0·770	90·26	6·29	6·06	3 68	1·6
	15	4 0¼	0·842	90·28	6·13	5·90	3·82	1·6
	Average	4 1¼	0·789	90·48	6·18	5·96	3·56	1·7

The bulbs were weighed and their specific gravity was taken. They were then cut open, and a sector taken from each for analysis. They were divided into three groups, as shown in the table, in accordance with their density and appearance. All those in the first group were hard and sappy, and showed no sign of fogginess. They have all specific gravities above 0·9. These are classed as sound turnips. In the last group, marked foggy turnips, were placed an equal number of bulbs, each of which was found to contain a considerable amount of soft corky tissue. Most of these had densities below 0·8, and the average is below 0·8. An equal number of bulbs were selected which were not distinctly foggy, but which had densities between 0·8 and 0·9, and some of which, for instance No. 3, showed to the eye and to touch signs of fogginess. On the other hand, some of these, for instance No. 8, appeared quite as sound and hard as those in the first group. No. 12 was quite hard and sound also, but appeared somewhat fibrous. These are called intermediate turnips. One portion of the chosen sector of each bulb was used for the determination of the total moisture in the turnip, the other portion was pulped and the juice expressed. A portion of the juice was weighed, and the percentage of dry matter in it determined. From these results the soluble and insoluble solids of the turnip were calculated, and by dividing the soluble solids by the insoluble, the ratio of these was determined.[1]

These turnips are low in average dry matter. Only two of them contain over 10 per cent; one of these, No. 11, is among the sound turnips, the other, No. 2, is among the foggy turnips. If we had been selecting seed-mothers merely according to percentage of dry matter, both of these would have been chosen. But the nature of the dry matter in the two is very different. In No. 2 about 4 per cent of the dry matter is insoluble and 6 per cent soluble. In No. 11 only 2¼ per cent of the dry matter is insoluble and 8 per cent is soluble. The ratio, therefore, of soluble to insoluble matter in the two is very different. In none of these turnips is the density high. In all of them it is less than one; in other words they all swam in water. The density bears little relation to the percentage of solid matter, but appears to bear a distinct relation to the fogginess. The sound turnips which have the highest average density have on the average a lower percentage of dry matter than the foggy turnips which have the lowest average density.

During the present winter several hundred yellow turnips and swedes have been examined by the short method described above in order to select seed-mothers. In all, two varieties of yellow turnips and two of swedes have been examined, and it has been found that the swedes give a much higher ratio of soluble to insoluble solids than the yellows. So far, therefore, as the work yet done gives us the means of judging, swedes contain a much larger proportion of their dry matter in soluble form than yellows do. For instance, the average of 100 bulbs of one variety of yellows gives a ratio of only 2·8, the average of the other variety was 3·1. On the other hand the average of 102 bulbs of one variety of swedes gives a ratio of 6·4, the average of another variety was 8·2. Not only had the swedes on the average a higher percentage of soluble dry matter than the yellows, but they had a lower percentage of insoluble dry matter. This is a point which is worthy of further attention, and may help to explain the high feeding value of swedes.

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[1] The soluble and insoluble solids and the ratio were determined as follows:—

Let a = percentage of total solids found in the bulb.
b = percentage of total solids found in the juice.
x = percentage of insoluble solids in the bulb.

Then, since $\frac{\text{soluble solids in turnip}}{\text{juice}} = \frac{\text{soluble solids in juice}}{100}$; $\frac{a - x}{100 - x} = \frac{b}{100}$.

Therefore, $x = \frac{100\,(a - b)}{100 - b}$. The percentage of soluble solids in the bulb $= a - x$.

The ratio $= \frac{a - x}{x}$.

Only one of the varieties examined contained foggy roots. This was the purple-top yellow variety, which gave an average ratio 3·1. There were 19 visibly foggy roots sampled in this variety. These gave an average ratio 1·7. All of these have been rejected as seed-mothers.

In all the varieties great variations were shown among individuals in the percentage of dry matter, as well as in ratio of soluble to insoluble matter, although these roots were all selected. They were not taken, like the roots in Table IV., just as they came in the drill, but all undersized and badly shaped bulbs were rejected, and only those of good size and appearance tested. Still they present such variations in composition that in all the varieties it will be possible to select as seed-mothers roots above the average in dry matter, free from fogginess, and above the average in ratio of soluble to insoluble solids. This was the object of the experiment.

It is not to be pretended that we have reached any final or conclusive result as to the methods by which turnips should be selected for seed-mothers in order to produce strains of improved composition as feeding-stuffs. The investigations dealt with in this paper are merely preliminaries intended to clear the ground, and to show, if possible, the direction in which advance may be expected. Any method whatever of selection for composition is an improvement on the methods which have been used in the past, even if we select only according to total dry matter, or to specific gravity of the juice. But probably as we go on we shall be able to improve our methods both as to ease and rapidity of manipulation and as to usefulness. It is not, however, for the agricultural colleges to prepare seeds for the public on a commercial scale. That must be left to the seed trade. But I have no doubt that if the chemists of the colleges can show that root crops can be improved by selection of seed-mothers for composition, and that there are practicable methods for carrying out such selection, there are enterprising firms who will be only too ready to take the matter up and carry it on in its commercial applications.

Much work is done and much money expended in producing new varieties of potatoes. During the recent boom fortunes were made and lost in the gamble for such varieties. Money and labour might be at least equally well spent in improving the not less important turnip crop. To carry out improvements on the lines suggested will require much time and the expenditure of capital. Meantime we shall do a work not without value if we can demonstrate the lines on which such improvements may be made.

THE CEREAL AND OTHER CROPS OF SCOTLAND FOR 1905, AND METEOROLOGY OF THE YEAR RELATIVE THERETO.

THE CROPS.

THE following comparison of the cereal and other crops of 1905 with those of the previous year has been prepared by the Secretary of the Society from answers to queries sent to leading agriculturists in different parts of the country.

The meteorology of the year has been furnished by Dr Alex. Buchan, Secretary of the Meteorological Society of Scotland.

The queries issued by the Secretary were in the following terms:—

1. What was the quantity, per imperial acre, and quality of grain and straw, as compared with last year, of the following crops? The quantity of each crop to be stated in bushels. What quantity of seed is generally sown per acre?—(1) Wheat, (2) Barley, (3) Oats.
2. Did the harvest begin at the usual time, or did it begin before or after the usual time? and if so, how long?
3. What was the quantity, per imperial acre, and quality of the hay crop, as compared with last year, both as regards ryegrass and clover respectively? The quantity to be stated in tons and cwts.
4. Was the meadow-hay crop more or less productive than last year?
5. What was the yield of the potato crop, per imperial acre, as compared with last year? The quantity to be stated in tons and cwts. Was there any disease? and if so, to what extent, and when did it commence? Were any new varieties planted, and with what result?
6. What was the weight of the turnip crop, per imperial acre, and the quality, as compared with last year? The weight of the turnip crop to be stated in tons and cwts. How did the crop braird? Was more than one sowing required? and why?
7. Were the crops injured by insects? State the kinds of insects. Was the damage greater or less than usual?
8. Were the crops injured by weeds? State the kinds of weeds. Was the damage greater or less than usual?
9. Were the pastures during the season of average growth and quality with last year?
10. How did stock thrive on them?

11. Have cattle and sheep been free from disease?
12. What was the quality of the clip of wool, and was it over or under the average?

From the answers received, the following notes and statistics have been compiled:—

EDINBURGHSHIRE. *Wheat.*—48 to 52 bushels; fine quality. Straw, heavy crop; 10 cwt more than last year. 3½ bushels sown.

Barley.—40 to 48 bushels; quality very good, and most of it used for malting. Straw about the same as last year. 3 bushels seed sown.

Oats.—44 to 50 bushels; quality very good. Straw very short, and selling 10s. to 15s. per ton more than last year. 4 bushels seed sown.

Harvest began three to four weeks earlier than last year.

Hay not so heavy as last year; 2 tons to 2 tons 10 cwt. About the same price as last year. Second crop very light; both crops fine got. *Meadow-hay*—Light crop, but fine got.

Potatoes.—Heavy crop; 8 to 10 tons. Very little disease. Prices about the same as last year. A lot of new varieties, with very good results.

Turnips.—Scarcely so heavy as last year. Yellows 20 to 25 tons, swedes about the same. Did not braird so well as last year, and a good deal of second sowing. Not injured by fly. *Mangold*—A heavy crop; about 30 tons.

No damage by insects. No damage by weeds.

Live Stock.—Pastures very good. Stock throve well and paid well, especially sheep. Both cattle and sheep free from disease. *Clip of wool*—About the same as last year, and sold much dearer.

LINLITHGOWSHIRE. *Wheat.*—48 bushels; superior quality to last year, both grain and straw. Seed sown, 4 bushels.

Barley.—44 bushels; quality about same as last year. Seed sown, 4 bushels.

Oats.—40 to 44 bushels. Ripened too quick owing to dry season. Straw very short. Seed sown, 4 to 5 bushels.

Harvest fully fourteen days earlier.

Hay.—35 to 40 cwt.; quality good, and well secured.

Potatoes.—8 to 10 tons; very little disease. Late-lifted potatoes would suffer from the early frost.

Turnips.—20 to 25 tons; did not braird well owing to dry weather, and a lot sown second time. Where first braird, a good crop.

No damage by insects.

Live Stock.—Pastures poor growth. Stock has not done well. Cattle and sheep free from disease. *Clip of wool*—Quality good, and a full average.

HADDINGTONSHIRE (Upper District). *Wheat.*—None grown.

Barley.—38 to 40 bushels; quality of grain and straw better than last year. 3 bushels sown.

Oats.—42 to 48 bushels; quality of grain and straw not so good as last year. 4 bushels sown.

Harvest began about the usual time.

Hay.—2 tons, of very good quality. *Meadow-hay*—Less productive.

Potatoes.—6 to 7 tons; no disease. No new varieties planted.

Turnips.—18 to 20 tons, of fair good quality; crop brairded well; one sowing.

No damage by insects or by weeds.

Live Stock.—Pastures not so good as last year, owing to the dry season. Stock throve fairly well. Cattle and sheep free from disease. *Clip of wool*—Average clip.

HADDINGTONSHIRE (Lower District). *Wheat.*—48 to 56 bushels; a much heavier crop than last year, and altogether a good yield. Seed sown, 3½ to 4 bushels, broadcast; drill, 2½ to 3 bushels.

Barley.—48 to 58 bushels; a much better yielding crop than last year, and quality exceptionally fine. About the same quantity of straw as last year. Seed sown, 3 to 4 bushels broadcast, and 2½ by drill.

Oats.—40 to 48 bushels; rather less straw than last year, but quality of grain good. Seed sown, 4 to 5 bushels broadcast. and 3 to 3½ by drill.

Harvest began about the 2nd of August, or fully a fortnight earlier than last year. Weather very favourable, and crop secured in first-class condition.

Hay.—From 1½ to 2 tons; considerably less than last year. Quality fair, and it was secured in good order. *Meadow-hay*—None grown.

Potatoes.—"Up-to-Dates" 9 to 11 tons; rather heavier than last year. "Maincrops" and "Langworthys" 8 to 9 tons; "Royal Kidneys" about 9 tons. "Northern Stars" about 11 tons. Very little disease, which appeared about the end of September amongst the earlier kinds.

Turnips.—20 to 30 tons; on an average, in this district of the county, rather less than last year. Good braird and no second sowing.

No damage from insects or weeds.

Live Stock.—Pastures rather scarce owing to the dry season, but the stock did very well. Cattle and sheep both free from disease. *Clip of wool*—Quality and quantity just about the average.

BERWICKSHIRE (Merse). *Wheat.*—About 44 bushels; straw good and very bulky. Grain and straw both considerably in excess of last year's crop. Quality good. Wheat is now only grown in exceptionally favourable situations. Seeding, 3½ to 4 bushels.

Barley.—Average about 38 bushels. Some fine samples to be seen, but a good deal of the barley was damaged in colour by rains in early harvest. Straw often short and weak. Seeding, 3 bushels.

Oats.—Average about 28 bushels. Bulk and quality very deficient, both of straw and grain; the former being very short and much damaged in some parts by rain in harvest. Seeding, 4 to 4½ bushels.

Harvest began with the month of August. Weather was very changeable. A week of dull damp weather did a great deal of harm to both barley and oats.

Hay, owing to the drought in June, was a very poor crop—not more than 30 cwt.—clover being deficient. Quality was excellent. Aftermath poor. *Meadow-hay*—Only about half the crop of previous year—say, about 1 ton. Not much meadow-hay in the Merse.

Potatoes.—Similar to last year—8 to 9 tons—with a great many extra large tubers, and an absence of seed and small sizes. Very little disease.

Turnips.—Crop very variable. Where brairding at once, swedes and early yellow turnips were a big crop—20 to 25 tons or more. When ground was too dry to braird well, crop was only moderate and roots small.

There was not much damage to crops from insects. Damage less than usual from weeds; were easily kept down owing to excessive drought.

Live Stock.—Pastures were very bare from June to September. Considering the scarcity of grass and bareness of pastures stock did well. Cattle and sheep free from disease. *Clip of wool*—Wool was a fair average clip.

BERWICKSHIRE (Lammermoor). *Wheat.*—Almost none grown.

Barley.—About 36 bushels; straw and grain about the same as last year. Quality generally about an average. Straw in some cases short and weak. Barley only grown in favourable situations. Seeding, 3 bushels.

Oats.—Average about 28 bushels; quality fair. Straw very short, about one-third under the average. Seeding, 4 to 5 bushels.

Harvest general in the second week of August; except at the beginning the weather was good and harvest not unduly prolonged.

Hay.—A very poor crop—from 25 to 30 cwt. Except that ryegrass was short and wiry, the quality was good. Aftermath very poor. *Meadow-hay*—Generally a poor crop; best in the latest districts. Quality good. Not more than half an average.

Potatoes.—Above an average crop, and very few small tubers—7 to 8 tons. Very little disease.

Turnips.—Generally fair crop when early sown and where the seed brairded well—20 to 25 tons. When ground was dry and brairding delayed, the crop is a short one. A good deal of finger-and-toe.

There was not much damage to crops from insects. Damage less than usual from weeds; were easily kept down owing to excessive drought.

Live Stock.—Pastures were very bare from June to September. Old grass pastures were good, though bare, and stock did well. Rotation pastures were too bare for stock in many cases. Cattle and sheep free from disease. *Clip of wool*—Ewes generally clipped well. Hogget wool was rather deficient.

ROXBURGHSHIRE. *Wheat.*—Not much grown. Heavy crop; straw good and also grain. Seed sown, about 3½ bushels; yield, from 30 to 40 bushels.

Barley.—Grain fair quality; straw small in bulk. Seed sown, about 3 bushels; yield, 30 to 35 bushels.

Oats.—Small crop, unless in high districts, owing to want of rain. Grain small in pickle, and straw small bulk. Seed sown, about 5 bushels; yield, about 35 bushels.

Harvest earlier than usual; very dry at first, but rain came on about end of August and injured a lot of grain.

Hay.—Very short crop, owing to very dry summer. *Meadow-hay*—Less productive than last year.

Potatoes.—Good crop; quality very poor. A good deal of second growth; almost no disease.

Turnips.—A most regular crop; some parts not a third of a crop. The seed brairded very badly owing to want of moisture; great deal of sowing over again was required.

Almost no insects. Not much damage from weeds.

Live Stock.—Pastures, little growth, owing to having almost no rain. Sheep stock did fairly well, but cattle did badly. Almost no disease. *Clip of wool*—Fair quality, quite up to average.

SELKIRKSHIRE. *Wheat.*—Almost none grown.

Barley.—Good crop; 38 bushels. Seed sown, 3½ bushels.

Oats.—Short crop owing to dry season; 32 bushels; quality good; straw very short, but well got.

Harvest very irregular. Very early where affected with drought, but on the whole satisfactory so far as the weather was concerned.

Hay.—Light crop; 28 cwt.; quality fair. *Meadow-hay*—Much lighter than last year; 22 cwt. per acre; well got.

Potatoes.—Large crop; fine quality; no disease.

Turnips.—Fine crop; similar quality to last year; 20 tons per acre. No second sowing; and indeed have done in all respects most satisfactorily.

No injury from insects. No injury by weeds.

Live Stock.—The pastures have been very bare owing to drought, and stock have not done so well as usual. Cattle and sheep free from disease. *Clip of wool*—Much above an average yield, and of excellent quality.

PEEBLESSHIRE. *Wheat.*—None.

Barley.—None.

Oats.—Fair crop, and about 20 bushels per acre; sown, 4 bushels.

Harvest commenced about the usual time.

Hay.—Good quality, but light crop; 30 cwt. *Meadow-hay*—None.

Potatoes.—No disease; 6 tons.

Turnips.—Crop light; about 15 tons.

No injury by insects or by weeds.

Live Stock—Pastures during the season were of average growth and quality with last year. Stock throve very well. Cattle and sheep free from disease. *Clip of wool*—Clip good.

DUMFRIESSHIRE (Annandale). *Wheat.*—No wheat grown in district.

Barley.—Not extensively grown. Yield of grain and straw slightly under last year; 34 bushels; 3 to 3½ bushels sown.

Oats.—The return from the oat crop is distinctly better as regards quantity. Lea oats a heavy crop, and badly lodged on some farms. This, coupled with a spell of wet weather from 2nd to 15th September during leading, seriously affected the quality of the grain. Yield of grain, 37 bushels; seed sown, 3½ to 4 bushels if drilled, 5 to 6 if sown broadcast. In new varieties, such as Abundance, Tartar King, and Storm King, up to 7 bushels per acre sown broadcast.

Harvest began about six days before usual time.

Hay.—Ryegrass hay would correspond with last year's crop both as regards quantity and quality. Weight, 28 cwt. Both years have been singularly alike in regard to scarcity of clovers. When the accompanying oat crop was cut in 1904 the clover-plant was so plentiful as to seriously interfere with "winning" in sheaves. When the hay crop began to come away in spring there was hardly any clover to be seen, and the resulting crop in the majority of cases was purely ryegrass. As to the reason for this different opinions are held, some blaming the wood-pigeons, which undoubtedly are too numerous in the district; others the growing practice amongst farmers of giving their seeds a top-dressing of nitrogenous manures in the spring. *Meadow-hay*—No marked difference in either weight or quality; 31 cwt.

Potatoes.—About 30 cwt. under last year; 5 tons. There was disease amongst the older varieties, such as Up-to-Dates, &c. This began with the spells of wet weather in September. No new varieties planted, at least to any extent.

Turnips a good sound crop. Roots not quite so big as last year, but more solid, and quality distinctly better; 17½ tons. Where the crop was got in early it brairded well. In June, however, there was a time of severe drought, and in not a few cases farmers then engaged with the crop had to sow a second time.

Farm crops generally have been free from insects, but again, as in 1904, complaints have been made about the mangel crop, which was in most cases a total failure. Not a few farmers attribute this to damage done by insects, and state that they will have to stop growing mangels. In lea oats a few patches were seen eaten by grub, but the damage from this pest may be stated as less than usual. Owing to an extremely dry June weeds of all kinds gave less trouble than usual.

Live Stock.—Pastures appeared to be of average growth, but at the autumn sales there was a general opinion expressed that stock, especially cattle, had not thriven so well as usual, a larger proportion of lean beasts being seen than in former years. Both cattle and sheep have been free from disease. *Clip of wool*—Quality good; weight over the average.

DUMFRIESSHIRE (Nithsdale). *Wheat.*—None grown.

Barley.—None grown.

Oats.—About 10 bushels more; straw about the same. Drier season, and regularly ripened.

Harvest began about usual time.

Hay.—Less than last year, about 5 cwt. *Meadow-hay*—Crop less.

Potatoes.—About the same weight—7 tons; very little disease noticed. No new varieties planted.

Turnips.—About 20 tons, of good quality. In most cases where seed was in early it brairded well. No second sowing required to any extent.

No injury by insects. Where there was carelessness and laziness redshanks and spirry injured the crop, but not more than usual.

Live Stock.—Pastures during the season were not of average growth and quality with last year. Stock throve not so well as when pastures are more luxuriant. Cattle and sheep free from disease. *Clip of wool*—About an average.

DUMFRIESSHIRE (Eskdale). *Wheat.*—None grown.

Barley.—None grown.

Oats.—Something similar to last year; quantity, from 35 to 40 bushels, Seed sown, 5 bushels.

Harvest started something about same time, about 30th August.

Hay.—Something similar to last year; but the aftermath came away better than last year. *Meadow-hay*—Similar to last year.

Potatoes.—Heavier than last year. There was a little disease amongst potatoes, which started about middle of August. No new varieties planted.

Turnips.—A good crop, similar to last year. Some of first sown did not braird well, owing to the spell of dry weather just when sown. No second sowing required.

No insects and no weeds.

Live Stock.—Growth of pastures similar to last year; but quality not so good, owing to dry weather in fore end of season. Stock throve fairly well. Cattle were free from disease; but a lot of sickness, mostly called braxy, among the hoggs of hill stock. *Clip of wool*—Similar to last year.

KIRKCUDBRIGHTSHIRE. *Wheat.*—34 bushels; 3 or 4 bushels better than last year. Quality good. Seed, about 3 bushels.

Barley.—35 bushels; better than last year; straw deficient. Seed, 3½ to 4 bushels.

Oats.—34 bushels; similar to last year. Quality not quite so good; straw, 25 to 30 per cent under average. Seed, 4½ to 5 bushels.

Harvest began about 12th August, ten days earlier than usual.

Hay.—28 to 30 cwt., being under an average; quality very good. *Meadow-hay*—Crop less productive than last year.

Potatoes.—About 7 tons; better than last year. More disease than usual.

Turnips.—About 17 to 18 tons; turnips sown before 9th May in many cases required to be resown; after that date brairded well. Growth after midsummer was retarded by dry weather; but after rain, end of October, turnips grew very rapidly and increased greatly in weight.

No injury by insects. Corn crop always more or less affected by charlock, but spraying is now more general, and with good results.

Live Stock.—Pastures considerably under average, owing to want of rain. Stock throve fairly well. Cattle and sheep free from disease. *Clip of wool*—Good; average weight.

WIGTOWNSHIRE. *Wheat.*—32 bushels; quality good; straw light. Seed sown, 2½ to 3 bushels.

Barley.—36 bushels; quality fair; straw fair quality, but limited in quantity. Seed sown, 3½ bushels.

Oats.—34 bushels, of good quality. Straw of good quality, but very deficient in quantity, owing to abnormally dry summer.

Harvest began ten days sooner than usual.

Hay.—Quantity, 1½ ton; quality very good, being secured in good weather. *Meadow-hay*—Less productive than last year.

Potatoes.—5 tons; no disease. No new varieties planted, but early potato culture is steadily advancing.

Turnips.—20 tons; crop brairded well; no second sowing, except in few instances, required. Crop looked somewhat deficient in early part of the season, but the autumn growth has produced a full crop.

No injury by insects; crops generally have enjoyed an immunity from damage by insects. No injury by weeds.

Live Stock.—Pastures were barely of average growth, but were not succulent, and cattle did not make the progress expected. Cattle and sheep free from disease. *Clip of wool*—Fair average both in quantity and quality, and the advance in price was a grateful change from the experience of recent years.

AYRSHIRE. *Wheat.*—44 bushels; very little grown. Good crop on suitable land. Seed, 3 bushels.

Barley.—40 bushels. Good crop, but showery weather during harvest injuriously affected sample. Seed, 3 bushels.

Oats.—46 bushels. Seed, 4 to 6 bushels.

Harvest began ten days earlier than usual.

Hay.—1 ton 12 cwt.; good quality. *Meadow-hay*—Fully an average.

Potatoes.—8 tons 10 cwt.; no disease of any account. No new varieties of any importance.

Turnips.—22 tons; generally good quality. Brairded well, and little resowing.

Crop not injured by insects to any amount. Usual weeds.

Live Stock.—Pastures generally *barer* than usual. Stock throve well. Cattle and sheep free from disease. *Clip of wool*—Good quality, and about average yield.

BUTE. *Wheat.*—None grown.

Barley.—3½ bushels sown; well got; under an average; 30 bushels; straw short.

Oats.—5 bushels sown; well got; under an average; 32 bushels; straw very short.

Harvest began very early, 10th August.

Hay.—Under an average—25 cwt.—but very good quality. *Meadow-hay*—Little grown; average crop.

Potatoes.—Above an average; early; 7 tons. Kinds planted, Puritans and Epicures. Late kinds planted, the Factor did best; 7½ tons.

Turnips.—Above an average; from 25 to 30 tons; very fine quality; no resowing.

No damage by insects or by weeds.

Live Stock.—Pastures good; more hand-feeding than usual. Cattle and sheep free from disease. *Clip of wool*—About an average.

ARRAN. *Wheat.*—None grown.

Barley.—None.

Oats.—About 30 bushels; straw less than average, owing to the season being dry and warm. Quality good. Seed sown, about 6 bushels.

Harvest began eight days earlier than last year; crop well secured.

Hay.—About 20 cwt.; quality very good, especially where not eaten much in spring. *Meadow-hay*—Better than last year; very little grown.

Potatoes.—Good yield, say 7 tons; quality above the average.

Turnips.—Say 15 tons; brairded very unevenly. Through dry weather, a good deal of canker or finger-and-toe. Have grown where left in till now.

Not more than usual damage by insects. Weeds much the same as usual.

Live Stock.—Pastures not so good on light land to start, improved with the turn of the day. Stock throve fairly well where they had a full bite. Cattle and sheep free from disease. Foot-rot in sheep got bad in the autumn, which tells sore on them. *Clip of wool*—Good in quality and fair in quantity.

LANARKSHIRE (Upper Ward). *Wheat.*—None grown.

Barley.—None grown.

Oats.—30 to 35 bushels; quality rather better than average. In some places crop rather deficient in bulk, owing to early harvest. Seed sown, 5 to 6 bushels.

Harvest began about the end of August, a fortnight or three weeks earlier than usual owing to the dry weather in early summer.

Hay.—A fair crop, averaging, say, 2 tons—being less than last year, owing to lack of rain in early summer. Very little aftermath. *Meadow-hay*—Less than last year, but well secured.

Potatoes.—A very good crop, averaging 8 tons; something similar to last year. Some disease, but not to any special extent, commenced in beginning of August. A great many different varieties of the tuber are now tried; but "Suttons," "Up-to-Dates," and "British Queens" continue favourites.

Turnips.—28 to 30 tons; rather better than last year. Brairded well; no resowing.

Not more than usual damage by insects. Weeds of the ordinary kind; easily dealt with in dry summer.

Live Stock.—Pastures good in early part of season, but failed early through lack of rain. Stock throve well. Cattle and sheep free from disease. *Clip of wool*—Quantity and quality average; prices improved.

LANARKSHIRE (Middle Ward). *Wheat.*—The weather during the autumn and early winter of 1904 was exceptionally favourable for the seeding of wheat, and a larger area was put in than has been sown for many years. The crop has also given a heavy return. The quality of the grain was good, but the straw was long, and in some cases much laid. From 25 to 56 bushels; seed sown, 3½ to 4 bushels. The conditions of seeding and harvesting were exceptionally favourable.

Barley.—Almost none grown.

Oats.—Oats have been a very fine crop; the quality of the grain and straw superior to any season during the last ten years; 35 to 60 bushels; seed sown, 4½ to 5 bushels.

Harvest commenced about the middle of August under favourable weather conditions, and the grain crops were secured with little labour and no loss. This was the earliest harvest for a number of years.

Hay.—Ryegrass and clover hay was a fair average crop, but not so heavy as during 1904. From 1½ to 1¾ tons per acre. The crop was well got, and was selling from the fields at £3 per ton. *Meadow-hay* or timothy hay gave a yield of 1½ to 2½ tons per acre, and was well secured.

Potatoes.—The season has been favourable for the growth of potatoes, and heavy crops have been raised, averaging from 8 to 14 tons per acre. There has been little disease, and the price is very low. This is not a potato district, and only under favourable conditions are potatoes planted.

Turnips.—Have been a good crop, yielding from 15 to 30 tons. The quality has been excellent, with no disease. The season has been a good one for cleaning the heavier lands during the growth of this crop. The earlier seedings gave the best results

There has been less damage from grub-worm than during any season for a long period. No damage by weeds.

Live Stock.—There was a want of rain during part of the season, which limited the quantity of pasture. The stock on the pastures throve well, but met a bad market at the end of the year. Practically no disease. *Clip of wool*—This is a mining district, and few sheep are kept.

LANARKSHIRE (Lower Ward). *Wheat.*—The crop of the season; 50 bushels, and 2 tons of straw. 4 bushels sown.

Barley.—None grown.

Oats.—A very light crop, deficient in straw owing to the drought, but thrashed well; 40 bushels, and 1 ton straw. 5 bushels seed.

Harvest was early—a week earlier than last year—and commenced about the middle of August.

Hay.—Ryegrass hay a light crop, owing to dry weather; 1½ ton. *Meadow-hay*—Much the same as last year.

Potatoes.—A very good crop; 8 to 10 tons. A few diseased; but a great many potatoes hurt with frost before they were lifted.

Turnips in this district a good average crop; 20 to 25 tons. They brairded well, and we heard of no resowing.

No injury to crops by insects. No injury by weeds.

Live Stock.—Pastures much the same as last year. Stock did very well on pastures. Quite free of disease.

RENFREWSHIRE. *Wheat.*—From 50 to 56 bushels; quality of both better than last year. From 4 to 5 bushels for seed.

Oats.—50 bushels; quality of both better than last year. 4 bushels for seed.

Harvest began rather earlier than usual, and was a very good one, especially so to those who were later in beginning.

Hay.—The crop was lighter than last year, but of better quality; I should say 10 cwt. to the acre lighter in weight. *Meadow-hay*—None grown in this part.

Potatoes.—Average yield about 9 tons; no disease; quality better than last year.

Turnips.—20 tons; quality good; first sowing brairded badly; none resown.

Insects—heard of none. Weeds—heard of none.

Live Stock.—Pastures during the season of average growth and quality with last year. Stock throve well. Cattle and sheep been free from disease. *Clip of Wool*—Good, and above the average.

ARGYLLSHIRE (Lochgilphead). *Wheat.*—None grown.

Barley.—None grown.

Oats.—Quantity fully up to last year; but in some parts the crops were badly laid, which lowered the quality of both grain and straw. Yield about 32 bushels. 5 to 6 bushels of seed sown.

Harvest started on 21st August, three weeks earlier than last year; about a fortnight earlier than usual.

Hay.—In some parts lighter and others heavier. Quality excellent; yield fully 2 tons. *Meadow-hay*—More productive in most cases. Owing to wet weather it was later in being cut, which might account for the extra bulk.

Potatoes.—A better average crop than last year, with very little disease; about 8 tons. The "Factor" and "Northern Star" varieties were planted for the first time, and turned out well in both cases.

Turnips.—The turnip crop in this district is the best that has been for some years, both in weight and quality; about 33 to 35 tons. A few acres of the very early sown turnips, after brairding, were destroyed with frost, and required a second sowing.

No damage done by insects. No injury by weeds.

Live Stock.—Pastures not so rank as last year, but better quality. Stock throve very well. Cattle and sheep free from disease. *Clip of wool*—Quality good; rather over the average.

ARGYLLSHIRE (Kintyre). *Wheat.*—No wheat grown in this district.

Barley.—Quantity not increased; quality of both grain and straw better. 3½ bushels sown.

Oats.—1 to 3 bushels per acre better. Better quality both grain and straw; improvement principally owing to better season for the district, and no worming.

Harvest ten days earlier than usual.

Hay.—Owing to dry spring the crop was lighter; quality good. *Meadow-hay*—More productive.

Potatoes.—Largest potato crop for number of years past; about 1 ton per acre better. Slight disease. Sutton's "Abundance," "British Queen," "Langworthy," "Up-to-Date," &c.

Turnips.—Good average of last year. Crop brairded well after rain fell; one sowing only.

Not much injury by insects. Weeds not so bad as usual.

Live Stock.—Pastures during the season of average growth and quality with last year. Stock throve well. Cattle and sheep free from disease. *Clip of wool*—Good, over an average.

ARGYLLSHIRE (Islay, Jura, and Colonsay). *Wheat.*—None grown.

Barley.—None grown.

Oats.—Better crop than last year, both as regards grain and straw. 6 bushels sown per acre. The quantity of the crop is so variable that it is impossible to state it with any degree of accuracy.

Harvest began about a fortnight earlier than the average.

Hay.—The hay crop was slightly heavier than last year, and the quality was a good average. *Meadow-hay*—About the same as last year.

Potatoes.—About the same as last year. There was some disease, but rather less than usual.

Turnips.—About the same as last year. Crop brairded well, and not more than one sowing was required.

Not more than usual injury by insects. About the usual crop of weeds.

Live Stock.—Pastures were of average growth and quality with last year. Stock throve very well. Deaths from disease have been about the average number. *Clip of wool*—Good, above the average.

DUMBARTONSHIRE. *Wheat.*—A good average crop; 34 bushels grain. Quality fair; straw medium length.

Barley.—Almost none grown.

Oats.—Nearly average crop; from 26 to 50 bushels. Straw short.

Harvest began rather earlier than usual.

Hay.—From 1 ton 15 cwt. to 1 ton 5 cwt. Quality good of both rye-grass and clover hay, and well secured. *Meadow-hay*—A good crop, but spoiled a little by rain in August.

Potatoes.—Early crop averaged 5 tons; late crop averaged 9 tons. Very little disease. Yield of late sorts equal to last year; while early crop was short by about 2 tons per acre.

Turnips.—A good crop; swedes about 28 tons and yellows 20 tons; both fair average crops. Brairded well; no resowing required.

No damage by insects, except some grub in lea oats. Weeds little trouble.

Live Stock.—Pastures as good as last year. Stock throve fairly well. There were some complaints of stock not fattening as quickly as usual. Cattle and sheep free from disease, but rather more braxy in sheep than last year. *Clip of wool*—Fully an average crop.

STIRLINGSHIRE (Western District). *Wheat.*—None grown.

Barley.—None grown.

Oats.—About 37 bushels; grain and straw good; straw shorter than in 1904. Seed, 4 to 6 bushels.

Harvest began about 22nd August, being ten days earlier than in 1904.

Hay.—About 1 ton 7 cwt. Quality was good, but a want of clover all over. *Meadow-hay*—Less than last year.

Potatoes.—Crop was better by about 1 ton 10 cwt.; very little disease. No new varieties planted.

Turnips.—20 tons; very good; brairded well; only one sowing.

No injury by insects. Very little injury by weeds—chiefly redshank. Not so much as in 1904.

Live Stock.—Pastures about same as last year. Stock throve well. Cattle and sheep free from disease. *Clip of wool*—About same as last year.

STIRLINGSHIRE (Eastern District). *Wheat.*—3½ bushels sown; produce, 50 bushels. Quantity and quality of straw and grain very good, with a good large acreage sown.

Barley.—3 bushels sown; produce, 30 bushels on carse, 28 bushels dry-field. Quality of straw and grain—carse, medium; dry-field, good. Middling seed-time for heavy land.

Oats.—5 bushels sown. Produce poor; straw short, and crop thin.

A good early *harvest.*

Hay.—Carse, 2 tons; dry-field, 30 cwt. Great deal of timothy grown on heavy land now; produce, 50 cwt. *Meadow-hay*—Short, but well secured.

Potatoes.—Produce, 6 tons; free of disease.

Turnips.—Dry-field produce, 22 tons; good, but some inferior crops; suffered from want of rain. Poor on carse land. No second sowing.

No injury by insects.

Live Stock.—Early grass good, but burnt up later. First half live stock throve well; did badly after. No disease. *Clip of wool*—Medium quality.

CLACKMANNANSHIRE. *Wheat.*—The yield will be from 35 to 40 bushels; straw short, and under the average. 3½ to 4 bushels sown.

Barley.—The crop in general, owing to dry summer, is short, being under the average; from 30 to 32 bushels. Seed sown, 3½ to 4 bushels.

Oats.—A short crop, under the average bulk; yield from 32 to 38 bushels; straw short, but of excellent quality. Seed sown, from 4 to 5 bushels.

Harvest.—Cutting commenced about a week earlier than last year which is about the usual time. Except for about a week at the beginning, there was good harvest weather, and the crops were secured in good condition.

Hay.—A small crop, but secured in fine condition. *Meadow-hay*—Nearly an average crop, well got in, and of fair quality.

Potatoes.—A fair average crop of good quality; yield from 6 to 7 tons. Very little disease, except in the earlier kinds. A great many kinds, mostly of the newer varieties, are planted. A few of the newer varieties are found to be good croppers, but lacking in quality.

Turnips.—The crop is under an average, except on a few early farms, where there are good crops. Average yield from 14 to 18 tons. There was little or no second sowing, although the seed in many instances remained in the ground a long time before brairding.

There was very little damage done by insects, except a few cases of damage by grub to oats. Owing to dry summer weeds were not troublesome.

Live Stock.—Pastures were not so good as usual; the weather being too long dry, the grass was dry in itself. Stock did not do so well on the grass as last year. No disease except foot-rot in sheep, which was very troublesome in autumn. *Clip of wool*—Not more than an average clip, but of good quality and fair prices.

FIFESHIRE (Middle and Eastern). *Wheat.*—This crop was exceptionally good this season, and the yield will turn out from 40 bushels to as high as 48 bushels. Quality of grain superior, and straw first-class. Natural weight, 63 to 65 lb. per bushel; return of straw, 2 tons. Seed sown—broadcast, 4 bushels; with drill machine, 3 bushels.

Barley.—Owing to the long spell of dry weather this crop has turned out short in straw, but gives an average yield of grain of fine quality and good colour—40 to 44 bushels, and straw 1 ton. Natural weight, 55 to 56 lb. per bushel. Seed sown—broadcast, 3 bushels; with drill machine, 2½ bushels.

Oats.—Medium crop; very short in straw, but excellent for fodder requirements; return of grain, 48 to 50 bushels. Seed sown, 4 bushels.

Harvest commenced about one week earlier than last year, and being favoured generally with good weather was expeditiously and cheaply completed.

Hay.—The hay crop, although not to be compared with last year's bulky crop, yielded fairly well, and quality equal to last year; averaging 2 tons. *Meadow-hay*—Only a small quantity grown in this district, which was less productive than last year, owing to the dry season.

Potatoes.—The potato crop was an excellent one, returning all over about 1 ton less than last year. "Up-to-Dates" very popular, about 8 tons; "Langworthys," 5 tons. Very little disease; and sample smaller than last year, but regular. New varieties less grown, the boom of last year unknown for them.

Turnips suffered very much because of the drought, and were early mildewed; but later in the season improved with rain considerably, and all over are an average crop of about 20 tons. The crop brairded well, and no second sowing was required.

Grain crops escaped the ravages of insect pests, but turnips suffered from the attack of wire-worms. No injury by weeds, which were not so prevalent as in ordinary seasons.

Live Stock.—Old pastures did exceptionally well, but average pastures were under an average growth, and the quality was not so good as last year. Stock did not thrive so well as usual. Cattle and sheep free from disease, with no reports of grass disease. *Clip of wool*—Very fine quality and over the average.

FIFESHIRE (Western). *Wheat.*—48 to 50 bushels for the finest coast wheat-lands, and about 40 bushels on lands farther back. The quality all over is fine, and straw much above average, both in quantity and quality.

Barley.—48 to 56 bushels on the very best farms, and 40 to 44 bushels on the secondary lands, and above average in quality. Straw good and well got, and about an average as to bulk.

Oats.—56 bushels on the very best farms, 40 to 44 bushels on average lands; all above average as to quality. Straw fine quality, but very short in most cases.

An early *harvest,* starting from the 18th to 21st August in the earlier districts, and a week later farther back.

Hay.—An exceedingly short crop of hay generally. On the drier lands it was burnt up, and it would only reach an average on deep soils and when heavily top-dressed. *Meadow-hay* was considerably under average.

Potatoes are a big crop, much above average. "Up-to-Date" and such varieties on the very best potato farms will be from 8 to 10 tons, and 7 to 8 tons on secondary lands, and not much disease. The new varieties planted nowadays are innumerable.

Turnips are a disappointing crop. Early sown swedes and yellows are good; but all the later sown fields when caught with the excessive dry weather never brairded till too late to make a crop, and are in many cases a failure.

No injury by insects. Very few weeds this year—the weather was too dry, even for weeds.

Live Stock.—Pasture grass was very indifferent all summer, the weather was too dry; but what was, was of good quality. Stock did well when they had plenty of grass, but when fields were fully stocked, indifferently. Cattle and sheep free from disease. *Clip of wool*—Over average, and of fine quality.

PERTHSHIRE (Western District). *Wheat.*—Fair crop; average yield 32 to 34 bushels. Good quality of both straw and grain. 3 to 3½ bushels of seed.

Barley.—The yield was below an average, but the grain and straw were of fine quality; average yield 28 to 30 bushels. Seed sown, 3½ bushels. A less area of barley was grown in 1905 than in the previous year.

Oats.—A short crop generally, but grain of good quality; average yield, 38 to 40 bushels in some districts, and 30 to 32 bushels in the higher districts. Seed sown, 4 to 4½ bushels.

Harvest was quite ten days earlier than in 1904, and on the whole was favoured with good weather. On some farms the period occupied at the harvest was the shortest on record, this being caused by light crops and excellent weather.

Hay.—On carse land, about 30 cwt.; well got and of fair quality. On dry-field land the hay crop was under an average in bulk, and in few cases would it much exceed 20 cwt.; the quality was not up to the average. Timothy hay, of which a considerable area is now grown in this district, would yield 35 to 40 cwt. *Meadow-hay*—An average crop and well got; not much grown in the district.

Potatoes.—Crop under an average; 5 to 6 tons, according to locality. The district shows a great variety of soils, and in general does not grow the heaviest class of crop. No more disease than in the previous year. The new varieties have been tried, but most farmers are coming back to the old sorts, such as "British Queens," "Up-to-Dates," and "Maincrops."

Turnips.—Under an average; 14 to 20 tons. Good quality. Plants brairded well, and no second sowing required. Season was too dry for the turnip crop.

No injury by insects. Probably less than usual weeds, as the dry summer was very favourable for working the crop.

Live Stock.—Old grass land did fairly well, but grass in regular rotation was not of average growth. Stock did not do too well, and in most cases where cattle were bought in during the spring they left nothing for their summer's keep. Cattle and sheep free from disease. *Clip of wool*—A full average as to weight and quality, and prices well maintained.

PERTHSHIRE (Eastern District). *Wheat.*—Fine crop, above average; grain and straw fine quality. Average yield about 36 bushels. Seed, 3 to 4 bushels.

Barley.—Bulky crop; good average; grain and straw good. Average yield about 40 bushels. Seed, 3 to 4 bushels.

Oats.—Lea oats a good crop where land was in good condition; otherwise the oat crop was a light one, especially after turnips. Grain nice quality; straw light but good. Average yield about 38 bushels. Seed, 4 to 6 bushels.

Harvest began about usual time; rather earlier.

Hay.—Good average crop—both ryegrass and clover—and very well secured. Yield, 2 to 3 tons. *Meadow-hay*—None grown in this district.

Potatoes.—A good crop, but not so heavy as last year; average yield, 7 to 8 tons. In some districts there was a considerable amount of disease amongst "Up-to-Dates" and other soft varieties. Such varieties as "Northern Star," "Evergood," "Royal Kidney," "Eldorado," and "Table Talk" produced splendid crops without any sign of disease.

Turnips.—The turnip crop has finished well, although it was adversely affected by the dry season, and will yield about an average of 20 to 25 tons, although there are instances of up to 35 tons. It has been healthy and free from finger-and-toe. It brairded only fairly well, and second sowing was necessary in many cases on stiff land.

Not more than usual injury by insects; grub and wire-worm did some damage to grain crops. Weeds not to any great extent, the dry weather helped to keep them down.

Live Stock.—Pastures rather barer than usual, but of good feeding quality. Stock throve well. Cattle and sheep free from disease. *Clip of wool*—Very good; above average.

PERTHSHIRE (Central District). *Wheat.*—Very little grown; about 30 bushels; quality good. An average crop. 3½ bushels sown. Well harvested.

Barley.—About 38 bushels; quality good. About 4 bushels sown. Not so much grown as usual; good harvest.

Oats.—From 44 to 50 bushels. In many places thrashed an extraordinary yield this year. Both grain and straw good, but the latter not bulking so heavy as usual. About 4 to 6 bushels sown. Very good and quick harvest.

Harvest began about the usual time and was very quickly finished, lasting about a fortnight.

Hay was not a heavy crop, about 1 ton 5 cwt. or 1 ton 10 cwt. *Meadow-hay* was a light crop, except in high and wet districts, where it was possibly the heaviest crop within recent years.

Potatoes were a good crop—6 to 8 tons dressed; but in many cases on thin land were very small, and could hardly be dressed for market. Practically no disease where lifted in time.

Turnips were not very good in this district as a whole. About 20 tons would be a good crop in the district. Crop was slow to braird, but there was not much second sowing.

There was not much damage by insects. Turnip-fly and wire-worm were in evidence in places, but not so general as in some seasons. Weeds were not bad this year.

Live Stock.—Pastures were much about an average; but on thin land they were not so luxuriant, and burned in some places. Stock throve well. Both cattle and sheep were very free from disease this season. *Clip of wool*—The clip of wool would be, if anything, slightly over the average this season, and the quality was good.

PERTHSHIRE (Highland District). *Wheat.*—None grown.

Barley.—A good crop; 34 bushels, and well got in. Breadth sown gradually decreasing.

Oats.—After lea a fair crop, thrashing well, but a little deficient in straw; 40 bushels. Yield on sown-out land, 28 bushels; straw of excellent quality.

Harvest early; general about 18th August.

Hay.—A very light crop and deficient in clover; average about 1 ton per acre; secured in good condition. *Meadow-hay*—A fair crop, though not so heavy as last year.

Potatoes.—Crop not so heavy as last year, about 6 tons; but considerable damage by frost on those not lifted before the 18th October. No new varieties planted.

Turnips.—Crop scarcely so heavy as last year, about 17 tons; generally of fair quality.

No damage from insects or weeds.

Live Stock. — Although the early spring was favourable for grass, as the season advanced it proved disappointing; though very dry, little burning took place. Parks were bare by the end of August. The autumn being mild, it proved advantageous for sheep. Cattle did not take condition so well as last year on grass. Sheep did well on the hill ground. Cattle and sheep have kept free from disease. The *clip of wool* was heavier than we have had it for several years, and quality good.

FORFARSHIRE (Western District). *Wheat.*—42 bushels; quality of both straw and grain first-class.

Barley.—44 bushels; quality of both straw and grain of the best.

Oats.—50 bushels; quality of both straw and grain first-class.

Harvest commenced about middle of August. From a fortnight to three weeks earlier than some seasons; about ten days earlier than usual.

Hay.—From 30 to 50 cwt.; quality very good, both clover and ryegrass. *Meadow-hay*—Practically none in this district.

Potatoes.—About 7½ tons. A little disease, but nothing to hurt; it commenced fairly early, but as the weather did not favour it, it did not develop to any extent. Very few, if any, new varieties from last year.

Turnips.—From 20 to 41½ tons. As last year was a perfect year for turnips, the quality would not be quite as good, although some fields would be as good. There was a bit of finger-and-toe in some places, and in fact a field or two in this district very bad. Not much, if any, second sowing.

No injury by insects to speak of. No injury by weeds.

Live Stock.—Where land was well managed the grass was good; some fields went rather soon bare. Stock throve fairly well, but did not leave much for grazing, as they were dear to buy in. Cattle and sheep kept very free from disease. The *clip of wool* would be a good average.

FORFARSHIRE (Eastern District). *Wheat.*—44 to 46 bushels; about same as last year; quality good. Straw above average, and secured in fine order. Seed sown, 4 bushels.

Barley.—Better crop than previous year as regards straw; 46 to 52 bushels; fine sample generally, with little "shag." Seed sown, 4 bushels.

Oats.—Not so good crop as last year; 50 to 54 bushels grain. Straw very short, but secured in first-class order. 4 to 6 bushels sown.

Harvest began 21st August, as against 27th August former year. Best harvest for many years, everything being secured in fine order.

Hay.—Good crop of, up to 4 tons; well mixed with clover, and well secured. *Meadow-hay*—None grown.

Potatoes.—About same yield as last year, up to 10 tons. Some disease; not keeping well in pits.

Turnips.—Not so heavy as last year; 20 to 25 tons; improved very much after middle of October. Some canker amongst swedes.

No injury by insects. Few weeds on well-farmed land.

Live Stock.—Pastures average; would have done with more rain. Stock throve well. Cattle and sheep free from disease. *Clip of wool*—Average clip and quality.

ABERDEENSHIRE (Buchan District). *Wheat.*—None grown in this district.

Barley or *Bere.*—About an average crop, both as regards grain and straw, yielding from 32 to 40 bushels, while the grain is fully better quality than last year's crop. Seed sown, from 3 to 4 bushels.

Oats.—Rather more straw than last year, although the quantity of grain will scarcely equal that of last year. Oats after lea were the heaviest, while both are of fine quality. Weight of grain about 42 lb., while many samples are as high as 44 lb. and over.

Harvest began eight days before the time last year.

Hay.—30 to 35 cwt. About an average crop, which was secured in first-rate condition. *Meadow-hay*—Little in this district.

Potatoes.—Yield and quality not equal to last year. New varieties not gone in for much. Great difficulty in getting the crop lifted owing to such wet weather, and in many cases not up yet.

Turnips.—A very heavy and excellent crop all over, except a few cases where disease has occurred. Swedes, 22 to 30 tons; yellows, 20 to 26 tons. Some of the very early sown had to be resown.

Live Stock.—Pastures not so luxuriant as last year, yet stock throve well during the earlier part of the season. Cattle and sheep free from disease. *Clip of wool*—Quality and clip of wool a good average.

ABERDEENSHIRE (Formartine District). *Wheat.*—None grown.

Barley.—Last year 38 bushels, this year 38 bushels, with an average bulk of straw. The bushel weight is good—viz., about 55½ lb. The quality of grain is very fine. Seed sown, 4 to 4½ bushels.

Oats.—Last year 44 bushels, this year 44 bushels, with nearly an average bulk of straw. The bushel weight is generally about 42 lb. Quality of grain and straw excellent. Seed sown, 5½ to 7 bushels.

Harvest began at the usual time, and the bulk of the crop was secured in excellent condition, before the weather broke.

Hay.—"Seeds," *i.e.*, ryegrass and clovers, are cut for hay, and yielded about 28 cwt., about the same weight as last year; quality very fine. *Meadow-hay*—Almost none grown.

Potatoes.—Last year 7 tons, this year 4 tons. Not much disease. Quality very bad. New varieties are being grown to some extent, which yield heavier crops, usually of inferior quality.

Turnips.—Last year 20 tons, this year 15 tons. The crop brairded well, almost no resowing being required.

There was very little damage from insects—less than usual; but the damage from rooks, wood-pigeons, and small birds is yearly increasing. The damage from weeds was rather less than usual.

Live Stock.—Pastures were of average growth, and appeared to be of good quality, but stock did not thrive so well on them as usual, owing to the wet weather during the latter half of July and almost the whole month of August. Cattle and sheep have been free from disease.

ABERDEENSHIRE (Strathbogie District). *Wheat.*—None.

Barley.—In the Strathbogie district, owing to the excessive drought during the months of June and July, the barley crop was generally deficient in straw; and as a natural consequence the quantity of grain has also been somewhat under the yield of a season when the rainfall is about normal during the growing portion of the season. The weight of the grain per bushel ranges from 55 lb. to 57 lb., and the quality is good.

Oats have also been short of straw; indeed this cereal appears to have suffered more from the drought than barley. The quality of the straw is good; but care has to be exercised in the stables and byres in order that the stock may be got comfortably through the winter and spring months. The yield of grain is generally good, considering the shortness of the straw; and the quality is also good where the crop was secured before the weather broke in the end of September. The grain weighs from 41 to 43 lb.

The *harvest* began earlier than an average season. Work proceeded quickly, as the crop was light and easily handled. It was noticeable that on very few farms where modern machinery was in use were there any harvest hands employed. The saving thus effected is quite a consideration to the farmer.

Hay was not generally a heavy crop, and where it was secured early it was of first-rate quality. The crop was well mixed with clovers. An average crop may be stated at 25 cwt.

Potatoes.—The potato crop would have yielded well; but unfortunately, owing to a long continuance of rainy weather at the end of harvest, they could not be lifted at the proper time. And much damage was caused by crows picking out tubers, and exposing others to the untimely frosts, of which there were a few. The quality is not nearly so good as last season, and the yield has also been deficient.

Turnips are a very variable crop. On the whole they would be about one-third less than last season; but then it has to be borne in mind that last year gave a bumper crop all over the country. The braird in numerous instances was slow to come, owing to the excessive drought which prevailed during the early portion of the season. There was no resowing rendered necessary.

Live Stock.—The pastures were of average growth and quality; but the grazing season was such that little, if anything, was obtained by feeding cattle on the pastures. It may be said that two-year-olds consumed the grass and gave no return for it. Fortunately, cattle and sheep have been exempt from disease. *Clip of wool*—The quality of the wool clip was average, and so was the quantity.

BANFFSHIRE (Lower District). *Wheat.*—None.

Barley.—An average crop of 38 bushels, of very good quality, weighing up to 57 lb. Seed sown, 4 bushels. Straw average quantity.

Oats.—An average crop of 40 bushels, of excellent quality, weighing up to 45 lb. Straw more than last year. Seed, 5 to 6 bushels.

Harvest about a week earlier than usual. Short harvest, fine weather.

Hay.—A fair crop of excellent quality, of about 150 to 200 stones.

Potatoes.—A fair crop, slightly diseased; average about 6 tons. A few new varieties were planted, and did fairly well.

Turnips.—An average crop of from 25 to 30 tons, of fair quality. Turnips came away well, and very little resowing.

No insects. No weeds.

Live Stock.—Pastures, owing to dry weather, were not an average. Cattle did fairly well. Cattle and sheep free from disease. *Clip of wool*—A fair average, of both quality and quantity.

BANFFSHIRE (Upper District). *Wheat.*—None grown.

Barley.—A fair average acreage seeded, with from 4 to 5 bushels seed per acre. This crop came out well with the early heat and forcing sunshine, and returned good grain, from 30 to 40, and exceptional cases, where well-strawed, 44 bushels; and where secured early and dry, weighed up to 57 lb.

Oats.—The oat crop was stinted from lack of moisture in June and July, and in the case of either hard light soil or stiff clays straw is again short; made a poor return of grain also, as low as 12 bushels. On fairly loamy deep ground the returns were fully average, 32 to even 40 bushels were had. That secured in time weighs up to 44 lb.

Harvest began similar to last year, early for this quarter by about two weeks, cutting beginning as soon as middle of August. And those farmers which had continuous work were most especially fortunate in securing crops, although under average bulk, of fine quality. Rain came on at 13th September, and harvest dragged miserably on for three to four months after, and crops were decimated one-half by game and bad weather. Both straw and grain nearly rotted in the fields. Horses were dying from having to eat wet sodden straw. The grain nearly rendered unfit for man or beast, the greater part of the best shaking out in the handling. No farmer of the present generation in these parts ever encountered the like experience.

Hay.—The hay crop suffered from a cold May and lack of sufficient moisture; never stocked with clover; yielded in most cases a poor dry stunted crop. It was well secured. Light land would only have 50 stones. In cases where loam and natural damp combined, 150 were got; these exceptional.

Potatoes.—In general an abundant crop of good quality. Potatoes are merely planted for home requirements, the bulk of the break being always used for the turnip crop. "Up-to-Dates" and "Sutton's Abundance" are the main varieties that have yet travelled north.

Turnip crops are not so generally good as last season. That laid down up to 10th June came on all well, and are full crops of healthy bulbs, about 25 tons of general average. Later sowings were slow and blanky in brairdings; these have spaces bare on the drills, or small bulbs in places here and there.

Turnip-fly wrought among late turnips for a time. No injury to speak of; the usual annuals were firmly kept in check with little trouble by drill-harrowing doing good execution in the dry season.

Live Stock.—Pastures were late of coming, and the drought took them off early. Stock had only bare feeding in June latterly, and where woodland or aftermath could not be had, suffered positive want of food and water. Happily nothing to complain of from disease. *Clip of wool*—Sheep came out well from the winterings, and clipped well, which also sold well.

MORAYSHIRE. *Wheat.*—A good crop, and splendid quality and weight; average, 44½ bushels—being 6½ bushels more than last year's average. Straw about an average crop; about 3½ to 4 bushels seed sown.

Barley.—Average, 31 bushels—much under an average crop, but same as last year's average. Straw was about 40 per cent below an ordinary average year; natural weight, from 55 to 57 lb. About 4 to 5 bushels seed sown.

Oats.—Average yield, 35½ bushels—being 2½ bushels more than last year. Weight from 42 to 44 lb. per bushel. Straw very short; about 44 per cent below an average crop; caused by the very dry weather in July and part of June.

Harvest about ten days before usual time.

Hay.—1 ton 8½ cwt.; quality about same as last year. *Meadow-hay*—Crop less.

Potatoes.—About 6½ tons, being 3 cwt. more than last year. In some instances slight traces of disease.

Turnips.—About 20 tons, same as last year. On some farms, well cultivated and carefully singled, weights will be found to run up to 38 tons, by careful weighing at the nitrate competitions. Brairded well; not much finger-and-toe.

No damage by insects. No damage by weeds.

Live Stock.—Pastures less growth than last year. Sheep did well, but cattle not so well, owing to the dry weather and burned-up pastures, and in some cases shortness of good drinking water. Cattle and sheep free from disease, except that disease called *abortion*, which is very prevalent amongst lots of breeding herds, pure or cross-bred. *Clip of wool* good, and about an average, or a little over.

NAIRNSHIRE. *Wheat.*—None grown.

Barley.—32 bushels; grain and straw good; 4 bushels sown.

Oats.—40 bushels; good; 5 bushels sown.

Harvest about ten days earlier.

Hay.—Crop about equal to last year. *Meadow-hay*—None.

Potatoes.—Not quite equal to last year; very little disease.

Turnips.—Weight not so much as last year; quality equal. Only once sown; a good deal of canker, especially in yellows.

No injury by insects. Not more than usual weeds.

Live Stock.—Pastures about equal to last year. Stock throve fairly well. Cattle and sheep free from disease.

INVERNESS-SHIRE (Inverness District). *Wheat.*—The yield was fully larger than last year, but the area under wheat was very small; 4 bushels usually sown broadcast and 3 bushels by drill-machines; 40 bushels an average return.

Barley looked very well in the field before reaping, but the return per acre was disappointing both as regards quantity and natural weight. The colour in most cases was darker than in 1904. Average return on best land, 40 bushels, and from 30 to 36 on lighter soils. Quantity sown, from 3 to 4 bushels.

Oats.—The oat crop was very good on best land, but straw was lighter than usual on badly cultivated and dry soils; the yield varies from 36 to 56 bushels. Quality sound and good, but rather dark in some instances.

Harvest began about the usual time, but some ten days later than 1904.

Hay.—There was a fair average crop of good hay; on best well-manured land, from 2½ to 3 tons, and on light land about 30 cwt. This is mixed ryegrass and clover hay. *Meadow-hay*—Very little grown in this district.

Potatoes.—The yield was quite one-third less than 1904. There was no disease, and the quality was good. On best land some 7½ tons would be an average return, and some 5 tons on lighter land.

Turnips.—The turnip crop was less than last year, but the quality was good, and they improved considerably in autumn. No resowing, and less disease than during the past few years, except 1904. From 25 to 30 tons on good land current.

No injury by insects. Weeds nothing unusual.

Live Stock.—Pastures during the season were of average growth and quality with last year. Stock throve very fair. Cattle and sheep free from disease. *Clip of wool*—Above an average in quality and staple.

INVERNESS-SHIRE (Island of Skye). *Wheat.*—None grown.

Barley.—None grown.

Oats were a very light crop. Straw is very good quality. Quantity of seed sown, 6 bushels.

Harvest began about ten days earlier than last year. Weather was stormy and wet at first, but finished up fine.

Hay.—Ryegrass and clover was very short, owing to the dry season. *Meadow-hay* was fully one-third short of last season; in fact, the worst crop for years in this country.

Potatoes were an average crop, and of very good quality. In some districts disease was rather bad; but anywhere in dry land they were quite free of disease. No new varieties planted.

Turnips were much above the average crop. They brairded very slowly, but once they came away they grew well all along, and remained sound until lifted. No second sowing required.

No damage done by insects or weeds.

Live Stock.—Pastures were very bare and much behind former years. Once August set in they improved very much. Sheep summered fairly well, but owing to the hot dry summer cattle did not at all thrive until late in the season. Cattle and sheep free from disease. *Clip of wool* would have been up to the average, but owing to the dry season and hot weather would not have been as clean in broken land as formerly.

INVERNESS-SHIRE (Lochaber). *Wheat.*—None grown.

Barley.—Very little grown.

Oats.—Crop about 32 bushels; seed about 6 bushels; quality good.

Harvest began about a fortnight earlier than usual.

Hay.—About 1¼ ton; quality good. *Meadow-hay* considerably more productive.

Potatoes.—About 4 tons. Not more than one-twelfth diseased. New varieties planted sparingly.

Turnips.—About 18 tons. Stiff in brairding, but no second sowing needed. Quality and quantity inferior on many farms.

Very little injury of any kind by insects. No weeds except where previous neglect had been conspicuous.

Live Stock.—Pastures below average growth, owing to drought. Stock throve fairly well. Cattle and sheep quite free from disease. *Clip of wool* a full average, of good quality, and satisfactory prices.

ROSS-SHIRE (Dingwall and Munlochy District). *Wheat.*—Almost none grown; what little was good quality.

Barley.—Quantity and quality of grain below average. Quantity of straw much below average, especially of lighter lands, owing to drought in June. Yield, say 30 bushels. Seed sown, quite 4 bushels.

Oats.—Quantity of straw below average, but rather above last season; quality fine. Quantity of grain, average say 38 to 40 bushels; straw of good quality. Seed sown, about 5 bushels.

Harvest began about 15th August. Weather on the whole rather broken, but was got completed in about thirty days.

Hay.—The quantity was less, and in some cases the quality was spoiled through wet weather; weight barely 2 tons. No meadow-hay.

Potatoes.—The crop was late; the quality not average; quantity also less. Almost no disease. Weight of crop, about 6 tons.

Turnips.—Crop brairded well; almost no second sowing; very little finger-and-toe. Crop grew well, and some fields would weigh 30 tons, and fine quality.

No injury by insects or weeds. Annuals were in a few cases.

Live Stock.—Dry weather threatened to cause a shorter growth of pastures. Stock throve very well. Cattle and sheep free from disease. *Clip of wool*—Good ; quite average.

ROSS-SHIRE (Tain, Cromarty, and Invergordon District). *Wheat.*—Not much wheat sown in district ; between 32 to 33 bushels ; average straw. Seed, 4 bushels or thereby.

Barley.—Under average ; weight light ; 30 bushels. Usual quantity of seed.

Oats.—No great bulk, but thrashed out better. Colour good ; weight not so ; 46 to 48 bushels.

Harvest ten to fourteen days earlier than last year.

Hay.—A better crop than last year all over. *Meadow-hay* —None grown in district.

Potatoes.—A splendid crop all over district and no disease.

Turnips.—A full average crop of swedes and yellows generally, but a poor crop on ill-drained lands.

Not much damage by insects. In wet lands the weeds got the upper hand. These were almost absent on well-farmed lands.

Live Stock.—Pastures average growth. Stock throve well. No disease in either cattle or sheep. *Clip of wool*—An improvement in clip and quality.

SUTHERLANDSHIRE. *Wheat.*—None sown.

Barley.—None sown.

Oats.—A fair crop, about 35 to 40 bushels. Straw deficient owing to excessively dry weather in summer.

Harvest rather earlier, ten days sooner than usual.

Hay.—On land in good condition the hay crop was an average one, about 1½ ton per acre ; on poor land, crop deficient. *Meadow-hay*—Crop rather less.

Potatoes.—A very good crop and no disease.

Turnips.—This crop not so good as last year, and was very stiff to come away owing to drought—especially yellows. On some places more than one sowing was required, and blanks prevalent in many fields.

Weeds not so troublesome as we have seen.

Live Stock.—In early summer pastures were bare on account of drought, especially on thin land. On deep moss land there was good grass all through. Stock throve very well. Cattle and sheep free from disease. *Clip of wool*—Quality very good and over an average.

CAITHNESS-SHIRE. *Wheat.*—None grown.

Barley.—The average yield would be 30 to 38 bushels, from 4 to 5 bushels seed.

Oats.—From 4 to 6 bushels sown ; the average yield would be 3 to 5 quarters, the straw being short and fine. Where harvested in good order the grain weighs 39 or 40 lb. per bushel, or even over that when hard dressed.

Harvest began at the usual time, and the ground and other conditions were most favourable for work till the 26th September. The weather then became so continuously wet that the grain and straw in stook were very much damaged, and it was impossible to get the crop secured but by field screws. Some early places had it all cut and stacked within seventeen days.

Hay.—Fair crop of 1½ ton, and there was a fair aftermath of clover. *Meadow-hay* was an average crop.

Potatoes suffered from drought, and when rain came there was a growth of small size. Disease also came on early and spread rapidly in many places; 3 to 4 tons new varieties were tried, but often succumbed to disease.

Turnips.—Very good crop where down in good time; 20 to 22 tons. Later sown turnips were blanky, but improved during the good September weather.

Saw-fly made havoc on the shaws of turnips till the rains came, and the caterpillars then perished or disappeared. Weeds (thistles, skellock, coltsfoot, sorrel, and spurrey) came in where there is any blank in crop and threatened to spread all over.

Live Stock.—Pastures were very good indeed, and clovers grew abundantly. Stock were in thriving condition. Cattle showed ringworm, and the compulsory dipping of sheep was conducive to their health by ridding them of keds and similar insects, as well as scab (if it existed). It is hoped the acarus is ended. *Clip of wool*—Average, and prices rising.

ORKNEY. *Wheat.*—None grown.

Barley.—The average yield of bere was about 36 bushels, weighing 50 lb. Seed, 3½ to 4½ bushels.

Oats.—Straw is rather short, but grain is good; average 34 bushels, weighing 40 lb. Both straw and grain are fully better than last year. Seed, 4 to 6 bushels.

Harvest began about the usual time, and fully a week earlier than last year.

Hay.—Grass being plentiful, a good deal of it was cut for hay, which was a fair crop, weighing about 22 cwt.

Potatoes.—A poor crop, and much diseased; little over half the quantity of last year; weight about 4 tons. Disease began about the end of August.

Turnips.—A very irregular crop; on some fields very good, and on others, especially on land worked on the fifth rotation, a very poor crop; much diseased with finger-and-toe. Weight about 10 tons.

Insects did little or no damage. Where turnips were diseased weeds took their place.

Live Stock.—Pastures were better than last year, and good all season; and stock throve well, and were free from disease, with the exception of a few cases of strangles among horses. *Clip of wool*—A good average.

SHETLAND. *Wheat.*—None grown.

Barley.—Straw more in quantity than last year; yield of grain about the same. Quality the same as last year. Average.

Oats.—Straw and grain in quantity about the same as last year. Quality not so good.

Harvest began about a week before the usual time.

Hay.—Both ryegrass and clover more in quantity than last year; the quality not so good. *Meadow-hay* was a larger crop than last year.

Potatoes.—The yield of the potato crop was less than last year by a third. Slight disease commenced about 15th August. Some new varieties were planted, of which the yield was not good, and which suffered from disease quite as much as the old varieties.

Turnips.—The turnip crop was not up to last year either in quantity or quality. The crop did not braird well, two sowings being required in many places.

Turnips were the only crop which suffered from insects (turnip-fly). There is seldom any damage from insects. Chickweed among the root crops did more damage and gave more trouble than last year.

Live Stock.—Pastures were of more than average growth, and the quality as good as last year. All stock did fairly well. Good average. No disease. *Clip of wool*—Quality good, and a good average in quantity.

THE METEOROLOGY OF 1905.

By Alexander Buchan, LL.D., F.R.S.

The following table gives a comparison of the wind, pressure, temperature, rainfall, and cloud, as compared with averages of the forty-five years from 1856 to 1900:—

1905.	Direction of Wind—Days								Calms.	Wind Force, scale 0 to 12	Mean Pressure in inches.	Mean Temperature, degrees.	Rainfall.		Mean Cloud, scale 0 to 10
	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.					In inches.	No of days.	
Jan. .	−1	−1	0	0	−1	0	+3	+1	−1	+0·3	+0·224	+2·2	− 1·14	− 1	0·0
Feb. .	+1	0	−2	−1	−1	−2	+4	+2	−1	0·0	+0·103	+1·0	− 0·32	+ 2	0·0
March.	−2	−2	0	+2	+2	+2	+1	−2	−1	−0·3	−0·265	+2·3	+ 1·23	+ 6	+0·4
April .	+1	0	0	0	−1	−1	−1	+2	0	−0·2	−0·080	−2·1	+ 0·41	+ 3	+0·6
May .	0	−1	−1	−1	0	+1	+1	+2	−1	−0·3	+0·151	+0·6	− 0·53	− 1	+0·4
June .	0	+3	+4	+1	0	−1	−3	−2	−1	−0·2	+0·036	+1·1	− 1·33	− 5	−0·5
July .	−1	−1	−1	0	−1	+1	+4	−1	0	−0·2	+0·058	+1·8	− 0·55	+ 1	+0·1
August	0	+1	+1	−1	0	−1	+1	0	−1	0·0	−0·047	−1·0	+ 0·25	+ 3	+0·5
Sept.	0	+1	0	0	−1	0	+1	0	−1	0·0	+0·052	−0·6	− 0·16	+ 1	0·0
Oct. .	+3	0	−1	−2	−2	−2	0	+4	0	−0·4	+0·156	−2·8	− 0·40	+ 1	−0·4
Nov. .	0	+2	+2	0	−1	−1	−2	0	0	−0·2	−0·202	−1·1	+ 1·27	+ 3	+0·2
Dec. .	−2	−1	0	0	+1	+1	+2	−1	0	+0·1	+0·230	+4·0	− 1·56	0	+0·4
Year .	0	0	0	0	−1	−1	+2	+1	−1	−0·2	+0·035	+0·6	− 0·30	+ 1	+0·2

January.—The mean temperature was 39°·5, or 2°·2 above the normal, the days being 2°·5 and the nights 1°·8 above their averages. In all districts the month was decidedly warmer than usual, being on the whole the mildest January since 1898. Very mild weather was experienced in the beginning of the month, the mean temperature of the first week being at many places from 6°·0 to 7°·0 above the normal. Highest readings for the month occurred at most places between the 4th and 8th, generally on the 6th, but at a few places on the 28th or 30th. Frosts, neither severe nor prolonged, occurred on four days, the minimum for the month occurring generally on the night of the 16th. In the latter part of the month temperature in Scotland was, as a rule, notably higher than in England. Thus during the third week the mean temperature of Aberdeen was nearly 5°·0 above that of London; and during the fourth week the nights at Braemar were 4°·0 warmer than those at Bath. The absolute maximum was 57°·0 at Airds on the 9th, and the minimum 15°·0 at Leadhills on the 17th.

The mean rainfall was 2·40 inches, or 3 per cent below the normal. In Orkney and Shetland, at Stornoway, and on the mainland at Dunrobin, Lairg, and Glencarron, rainfall was much above the average, the excess at Lairg being 68 per cent; whilst over the greater part of Inverness-shire about the average amount fell. Elsewhere there was a decided shortage, more pronounced in the east than in the west. Thus of the eastern stations the amounts at several places were under half an inch; and several, such as Arbroath, Dundee, and Duns, less than one-fifth fell; and many others only from a quarter to a half of the usual fall of January. The greater part of the month's rainfall occurred before the 12th, and on the east coast little rain fell after the 17th.

A north-westerly gale, with very high tides, occurred on the 6th and 7th; from the 14th to the 17th strong and destructive gales from south and east were almost continuous; and the 30th was again stormy.

Bright sunshine was deficient in Orkney; but elsewhere was about or above the average.

FEBRUARY.—The mean temperature was 39°·2, or 1°·0 above the mean, the days being 1°·4 and the nights 0°·6 above their respective averages. It was under the average in Shetland, the Hebrides, and at a few coast stations round the Moray Firth; but elsewhere it was above the average, the excess increasing towards the south and south-east, being 2°·0 at Drumlanrig, Dumfries, and Wolfelee. A good deal of mild weather was experienced, and there was no prolonged occurrences of frost. On the 5th, Aberdeen and Crathes, with 57° 0, were warmer than places in the south of England and the Channel Islands. Low temperatures occurred on the 11th, Marchmont reporting 19°·0 and Leadhills 16°·0, and again the 21st was specially cold. The warmest days were the 5th, and from the 13th to the 18th. The absolute maximum was 57°·3 at Clathick on the 14th, and the minimum 11°·1 at Kingussie on the 21st.

The mean rainfall was 2·77 inches, or 10 per cent below the normal. There was a decided shortage over the eastern half of the country from Peterhead to Berwick, a less pronounced deficiency in central Perthshire, the Clyde area, and the southern counties. Elsewhere the rainfall was more or less above the average, but largely in excess towards the north. In the east and south-east many stations had less than half the average, and at about a dozen the amounts were less than an inch. On the other hand, Lairg had an excess of 80 per cent, and Stornoway, Glencarron, and Fort Augustus of more than 40 per cent. Little rain fell from the 21st to the 23rd, and in the east practically no rain fell from the 2nd to the 11th. Heavy falls occurred at many places between the 12th and 18th; and at Laudale, on Loch Sunart, 2 39 inches fell on the 25th.

The weather was stormy on the 1st, 18th, and 19th, and very unsettled towards the end of the month. Hail, sleet, and snow were of frequent occurrence, but the falls were generally slight.

Bright sunshine was in general above the average, but below it at Deerness and Marchmont.

MARCH.—The mean temperature was 41°·9, or 2°·3 above the normal, the days being 2°·2 and the nights 2°·4 above their respective averages. Thus the excess of temperature was nearly equally partitioned between the days and nights. Temperature was decidedly above the normal in all districts, and at a few stations frost in shade was not recorded. The lowest temperatures were generally recorded on the 2nd, though at some places on the 9th, 17th, or 21st. The mildest weather was from about the 19th to the 23rd, the highest temperatures generally occurring on the 22nd, when readings above 60°·0 were noted at Paisley, Glasgow, Dunfermline, in the Lothians and Border counties, and at Dumfries. The absolutely highest temperature was 64°·7 at Corstorphine on the 22nd, and the lowest 16°·4 at Braemar on the 2nd.

The mean rainfall was 4·14 inches, or 42 per cent above the average. At Duns Castle the rainfall was just the average, and at Marchmont, Wolfelee, and Glencarron the excess was only trifling, but the general rainfall over the country was greatly above the average. Thus Lednathie and Fearn had two and a half times their average amounts; and at Dunrobin, Keith, Kingussie, Braemar, Montrose, Comrie, Stobo, and Drumlanrig there was an excess of 80 per cent or upwards. The weather was wet and unsettled from the 3rd to the 17th, with heavy falls on several days, Dunrobin registering 1·58 inch and Glencarron 1·39 inch on the 11th, and Leadhills 2·09 inches on the 15th. Rain was again frequent in most districts after the 23rd, with heavy falls on the 23rd and 25th; on the 25th there fell at Lednathie 1·91 inch. This rainfall was in striking contrast to the small amounts for January and February, the aggregate for these two months at a good many eastern stations being less than the total for March.

On the 15th occurred a gale of great severity from south and south-east. Showers of hail and sleet were frequent during the earlier half of the month.

Bright sunshine was above the average on the east coast, below it on the west, and very deficient in Orkney.

APRIL.—The mean temperature was 42°·0, or 2°·1 below the normal, the days being 2°·7 and the nights 1°·4 below the respective averages. Temperature was decidedly below the average in all districts, and a great deal of very cold weather was experienced, especially during the first half of the month. The coldest period was from the 6th to the 9th, when temperature at many stations failed to reach 40°·0 on one or more days. The night of the 7th was nearly everywhere the coldest of the month, the temperature at Balruddery, Leadhills, Wolfelee, Drumlanrig, and Cally falling to 20°·0 or under. The absolutely highest temperature was 63°·4 at Cally on the 30th, and the lowest 16°·0 at Leadhills on the 8th.

The mean rainfall was 2·68 inches, or 18 per cent above the average. The distribution was very irregular. At Lairg, Arbroath, Edinburgh, and Wolfelee the amounts were about the average, whilst at Dunrobin, and in the greater part of the counties of Inverness, Perth, and Fife, there was a shortage of varying amount. On the other hand, Kelso had more than twice its average rainfall, and in the Nith Valley, Berwickshire, part of Aberdeenshire, and at Montrose there was an excess of 50 per cent or over. Falls of 1 inch or more in one day occurred on the 1st at Lochbuie, Greenock, and Leadhills; on the 14th at Lednathie; and on the 28th at Duns, Marchmont, and Broomlands,—the largest of these, 1·43 inch, at Duns on the 28th. The last few days of the month were unsettled and wet. No rain fell from the 18th to the 25th at Clathick, Dunfermline, Glasgow, and Bothwell.

A good deal of snow fell from the 5th to the 9th, the storm being of considerable severity in the north; and again about the end of the third week the weather was of a very wintry character.

Bright sunshine was below the average, especially towards the south-east.

MAY.—The mean temperature was 49°·6, or 0°·6 above the normal, the days being 0°·8 and the nights 0°·5 above their respective normals. Temperature was decidedly above the average over a wide area, stretching from the Grampians towards the south-west; but a good many stations differed but little from their means, whilst towards the north-west and north-east the month was slightly colder than usual. Low temperatures ruled about the 5th, but thereafter, until the 20th, warm weather was experienced. With north and north-east winds an exceedingly cold spell prevailed for a few days from the 21st, with dry temperatures and sharp ground frosts. Thus Aberdeen had a maximum less than 50°·0 on the 21st, 22nd, and 25th, whilst even at Dumfries and Cally frost in shade was reported. The highest temperatures occurred generally about the 17th, but in the east and south-east more usually toward the end of the month. The absolutely highest temperature was 78°·0 at Stronvar on the 17th and at Poltalloch on the 19th, and the lowest 24°·0 at Leadhills on the 22nd.

The mean rainfall was 1·76 inch, or 23 per cent below the normal. In parts of the counties of Banff, Ross, Inverness, and Argyll there was a moderate excess, but over the greater part of the country a decided deficiency, which was most pronounced in the Lothians and the Border counties. Thus the Lothians had less than half and Berwickshire only about one-third of their averages. In general the month was the driest May since 1896. In some districts the earlier part of the month was unsettled, and on the 10th there was a fall of 1·50 inch at Lochbuie; but the chief feature of the month was an all but absolute period of drought from the 13th to the 22nd, and no rain fell at Crathes from the 2nd to the 23rd. Thereafter the weather was wet, with heavy falls between the 24th and 29th, Dumfries registering 1·37 inch on the 28th.

Hail fell at a few places early in the month. Sunshine was below the average, except towards the north-west. For the week ending the 27th Edinburgh had an aggregate of only 15 hours.

JUNE.—The mean temperature was 56°·0, or 1·1 above the normal, the days being 2° 0 and the nights 0°·3 above their respective averages. Thus this large excess was almost wholly occasioned by the temperature of the days, owing to the unusually large sunshine which prevailed, especially in the west. At sea-coast stations in the east, from Nairn to the Tweed, the temperature was a little under the average; but in striking contrast with the above, temperature in the west was at places from 2°·0 to 4°·0 above the normal. The month opened with fairly high temperatures, followed by a cold spell until the 12th, with winds from north-east. Thereafter the temperature was much higher, though in the east the only really warm weather was on one or two days towards the end of the month. The coldest days were the 7th, 11th, and 12th, and at Crathes and Lednathie frost in shade was reported on the 11th. Almost everywhere the warmest days were from the 23rd to the 27th, Dumfries and Cargen recording temperatures above 80°·0 on each of these five days. The absolutely highest temperature was 85°·0 at Buchlyvie on the 25th, and the lowest 31°·3 at Crathes on the 11th.

The mean rainfall was 1·19 inch, or 53 per cent under the normal, being the smallest mean rainfall for June since 1891. At Kingussie there was a slight excess, and Drumlanrig had nearly its average rainfall, but generally over the country there was a very pronounced deficiency. At Bothwell and in parts of East Lothian and Berwickshire the aggregate was less than half an inch, and nearly one half of the stations had falls of less than an inch. Deficiencies of from 40 to 60 per cent were common, and at several places, such as Gordon Castle, Duns, and Glasgow, the shortage was at least 75 per cent. Rain was more or less general till the 3rd or 4th; an absolute drought then set in lasting till the 17th, when heavy rains set in till the 20th. Thereafter in most western districts no rain fell; but towards the close of the month there occurred thunderstorms in central and eastern Scotland, associated with heavy rainfalls. The largest daily rainfalls were about an inch at Stronvar, Glencarron, Kingussie, and Cargen.

A thunderstorm of great severity took place in Lochaber on the 23rd and 24th, being very destructive on the West Highland Railway. Thunderstorms occurred about the 26th and 27th also in the east and north, following somewhat irregular courses and accompanied with local rains.

The amount of sunshine was unusually large, especially in the west; and during the latter part of the month, from the 24th to the 25th, fog was rather prevalent, from the 24th to the 27th in the east and north.

JULY.—The mean temperature was 59°·1, or 1°·8 above the normal, the days being 2°·5 and the nights 1°·2 above the respective averages. The month was the warmest July since 1901, the mean temperature of which was 61°·8. All districts were warmer than usual, nearly all by at least 1°·0, and several southerly stations by as much as 3°·0. Readings of 80°·0 or over were noted at Crathes on the 7th, at several southerly stations on the 9th, at Perth on the 10th, at Clathick on the 11th, at Smeaton on the 14th, and in Dundee district on the 21st. Generally the week ending the 15th was the warmest of the month. The absolutely highest temperature was 85°·0 at Stobo on the 9th, and the lowest 33°·2 at Kingussie on the 19th.

The mean rainfall was 2·57 inches, or 18 per cent below the normal. At Deerness and Shetland there was an excess, as also to a trifling degree at a few mainland stations—as Glencarron, Peterhead, Helensburgh, and Boswell. But in general there was a decided deficiency, less than the normal being registered in parts of the counties of Inverness, Forfar, Perth, Peebles, Kirkcudbright, and Dumfries. Heavy falls occurred on the east coast; on the 2nd Smeaton registering 1·01 inch, at Laudale 1·65 inch fell on the 9th, and 1 inch or more at Bothwell on the 9th, Dumfries on the 16th, and Lochbuie on the 11th, 21st, and 29th, the weather being unsettled about these dates. On the east coast little or no rain fell from the 6th to the 10th, while the rainy days varied from 26 at Lairg to 8 at Montrose.

Sunshine was above the average, especially towards the south-east; and a considerable amount of fog is reported on the 2nd, from the 9th to the 14th, and from the 20th to the 22nd.

AUGUST.—The mean temperature was 55°·5, or 1°·0 below the normal, the days being 1°·2 and the nights 0°·9 below their respective averages. In Mid-Lothian, and at Poltalloch, Lochbuie, and Deerness, the month was of fully average warmth, but in most districts there was a decided deficiency, amounting at Fort Augustus to as much as 2°·4. No spell of markedly cold or warm weather occurred, temperature varying with the direction of the wind. At most stations south of the Grampians the 31st was the coldest day of the month, but towards north-west and north lowest readings occurred usually about the 9th, 15th, or 24th; the highest readings were noted from the 2nd to the 4th, 14th and 17th, and 22nd and 24th. The absolute maximum was 75°·5 at Dumfries on the 25th, and the minimum 32°·0 at Lednathie on the 31st.

The mean rainfall was 3·93 inches, or 7 per cent above the normal. The distribution was rather irregular, the variations ranging from an excess of 40 per cent at Dumbarton to a deficiency of 40 per cent at Cupar. There was a slight shortage in Moray and Nairn and in parts of the counties of Inverness, Forfar, Fife, and Dumfries, whilst the excess was most decided around the Clyde estuary and towards the south-west. Some heavy falls were reported—1·24 inch at Lednathie on the 3rd, 1·57 inch at Poltalloch and 1·38 inch at Greenock on the 4th, 1·17 inch at Dumbarton on the 7th, and 1·18 inch at Glencarron on the 16th. In southern districts there was a dry spell from the 12th to the 16th, and in northern districts from the 14th to the 16th. The weather of the month was on the whole extremely unsettled, especially about the 19th and 26th.

Sunshine was below the average on the mainland, but slightly above it at Deerness.

SEPTEMBER.—The mean temperature was 52°·2, or 0°·6 below the normal, the days being 0°·9 and the nights 0°·4 below their respective averages. At a few scattered stations, such as Leith, Aberdeen, and Inverness, temperature was equal to or above the average, but at most stations, and particularly towards the south-west, the month was colder than usual. Some fairly high temperatures occurred early in the month, especially on the 3rd and 4th, but after the 9th the weather was markedly cooler, with lowest readings in most districts on the 21st, when a good many stations, including Crathes, Perth, Broomlands, and Drumlanrig, registered frost in shade. The absolutely highest temperature was 71°·0 at Arbroath on the 3rd and Dumfries on the 4th, and the lowest 27°·0 at Stobo on the 21st.

The mean rainfall was 2·76 inches, or 22 per cent below the normal. In Berwickshire and Poltalloch the average amount was collected, whilst Glencarron had an excess of 30 per cent, and Airds had nearly its average doubled. But in most districts there was a large deficiency, which was most marked in the counties of Forfar, Perth, Fife, and Dumfries, these having only about half their average rainfalls. The first ten days of the month were very wet, with heavy falls in the west. From the 13th until the end of the month but little rain fell in the west, but in the east some remarkable falls took place after the 23rd, and on the 26th and 27th heavy falls in East Lothian and Berwickshire caused damage to crops. From the 1st to the 10th strong S.W. winds prevailed. Thereafter the weather was of a settled character until about the 23rd, after which N.E. winds adversely affected the weather.

Sunshine was above the average, especially towards the north.

OCTOBER.—The mean temperature was 43°·7, or 2°·8 below the normal, the days being 2°·3 and the nights 3°·4 below their respective averages. The month was the coldest October since 1896, the nights being especially cold, and the temperature deficiency well marked in all districts. Some fairly warm weather was experienced during the second week, but thereafter, until about the 25th, temperature remained exceedingly low under the influence of northerly winds; indeed in some districts the week ending the 21st had a mean temperature as much as 7°·0 below the average. About one-third of the stations had shade temperatures below 25°·0 on one or more days between the 16th and 20th. Perth, for example, had frost in shade each day from the 15th to the 28th. The absolute maximum was 67°·0 at Arbroath on the 9th and Clathick on the 10th, and the minimum 19°·0 at Leadhills on the 16th and Stronvar on the 20th.

The mean rainfall was 3·64 inches, or 10 per cent below the normal. In the Moray Firth area and in the extreme northern counties rainfall was above the average, the excess in Banffshire being very large, as much as 83 per cent at Gordon Castle. At Aberdeen, Braemar, Arbroath, Smeaton, Broomlands, and Cally the normal amount was registered, but elsewhere there was a shortage of varying amount. Glencarron had 30, Deerness 29, Gordon Castle 27 days with rain. Heavy falls occurred in the west on the 3rd—1·75 inch at Bowhill, 1·54 inch at Lochbuie, and 1·37 inch at Fort William. Heavy falls also occurred on the 30th and 31st at Inverness, Braemar, Arbroath, and Lednathie, the falls being an inch or more. Except in northern and south-eastern districts hardly any rain fell between the 16th and 24th.

The weather was unsettled early in the month and towards its close, with showers of snow, sleet, and hail in many districts between the 14th and 20th.

Sunshine was of irregular distribution, but the third week was everywhere exceptionally sunny.

NOVEMBER.—The mean temperature was 39°·8, or 1°·1 below the normal, the days being 1°·4 and the nights 0°·8 below their averages. The temperature deficiency was well marked in nearly all districts, and, on the whole, the month was the coldest November since 1893. Some fairly mild weather was experienced early in the month, but about the middle of the third week there set in a frost of unusual severity for the time of the year. On the night of the 17th the sheltered minimum at Braemar fell to 5°·2, and on the following night shade readings of 15°·0 or under were noted at several stations, including Kingussie, Lednathie, and Drumlanrig. There was a rapid recovery of temperature after this cold spell, with high readings on the 22nd and 23rd. The absolutely highest temperature was 56°·5 on the 17th at Leadhills, and the lowest 5°·2 at Braemar on the 17th.

The mean rainfall was 5·07 inches, or 33 per cent above the normal. At Kingussie, in the extreme west, and in parts of the southern counties, the amounts were below or just equal to the average, but in nearly all other districts there was a large excess, which was very pronounced towards the north-east. Thus Keith, Tillypronie, and Montrose had more than twice their usual amounts, whilst the largest totals reported were 9·41 inches at Crathes, 2·25 inches falling there on the 11th. Very wet spells occurred, especially in the east, from the 1st to the 7th and from the 10th to the 14th. The west coast rainfall was heavy from the 22nd to the 26th, the 26th being a very wet day in all districts. Falls may be noted of 2·02 inches at Bendamph on the 22nd, and 2·05 inches at Lochbuie on the 26th.

The weather of the month was of a most variable character, the early days being stormy in the north and gales general about the 13th and 26th. Snow fell in most districts during the cold spell towards the end of the third week. Sunshine was rather above the average.

On the night of the 15th there was an unusually brilliant display of aurora generally observed, the colours being described by the Deerness observer as scarlet and orange.

DECEMBER.—The mean temperature was 42°·1, or 4°·0 per cent above the normal, the days being 3°·5 and the nights 4°·6 above their respective averages. The temperature excess was well marked in all districts; and within the last thirty years, only in 1898 and 1900 has the mean for December been higher. The only important interruptions of cold were experienced about the 12th and 13th, and again at the very close of the month, when south-easterly winds displaced the prevailing south-westerly air currents to which the remarkable mildness of the month was due. It is noteworthy that the mean temperatures of both day and night were above those for November, and that of the nights above even that of October. The absolutely highest temperature was 58°·9 at Loanhead on the 20th, and the lowest 14°·0 at Lednathie on the 12th.

The mean rainfall was 2·77 inches, or 33 per cent below the normal, and the month was on the whole the driest December since 1892. Only a few isolated stations approached their average amounts, but the deficiency was more marked in the east than in the west, and greatest in north-eastern and south-western districts. Some stations registered less than one inch, and Gordon Castle and Duns had only about one-fifth of their usual amounts. The rainiest periods were from the 5th to the 8th, and from the 19th to the 24th; and we may note the following heavy falls—1·39 inch on the 5th at Stronvar, 1·63 inch on the 20th at Fort William, and 1·31 inch at Kilmarnock and 1·12 at Drumlanrig on the 24th.

The weather was stormy on the 30th and 31st. At only a few places was snow, sleet, or hail recorded.

Sunshine was above the average in the east, but deficient in the west and in Orkney.

The droughts which prevailed in many districts from the end of spring till the beginning of September had an injurious effect on the turnip crop, making second sowings necessary in many places. Pastures also suffered from the same cause, particularly in eastern districts to south of the Grampians; also in Galloway and Ayrshire, and generally, though in a less degree, around the Moray Firth.

Everywhere the crops were cut generally about a fortnight earlier than usual, but in late districts the ingathering was much delayed and the crops more or less damaged by the autumnal rains.

As regards the cereals, *wheat* and *barley* over eastern districts to south of the Grampians were very good averages. *Oats* showed fairly good averages, but owing to the drought a considerable shortage of straw; and the rains of September did considerable damage to the quality of the grain, especially in late districts.

Potatoes everywhere, except in the extreme north and north-east, were at least an average crop. In some cases the crop was a heavy one, but the late rains interfered with the lifting of the crop. Disease appeared badly at only two or three places; elsewhere it did not appear at all, or only very slightly.

AGRICULTURAL STATISTICS.—Returned upon 4th June 1905.—(*Compiled from the Government Returns.*)

Table No. 1.—Acreage under each kind of Crop, Bare Fallow, and Grass, in each County of Scotland.

Counties.	Total Acreage under Crops, Bare Fallow, and Grass.	Corn Crops.							Green Crops.							Clover, Sainfoin, and Grasses under Rotation.	Permanent Pasture (exclusive of Mountain Land).	Flax.	Small Fruit.	Bare Fallow or Uncropped Arable Land.
		Wheat.	Barley or Bere.	Oats.	Rye.	Beans.	Peas.	Total.	Potatoes.	Turnips.	Mangels.	Cabbage, Kohl-rabi and Rape.	Vetches or Tares.	Other Green Crops.	Total.					
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
1. Aberdeen	630,477	11	23,708	189,078	255	529	361	213,942	7,736	87,550	12	211	2,502	808	98,819	278,615	38,397	..	344	360
2. Argyll	134,865	..	1,307	17,733	476	68	1	19,585	4,306	5,592	49	196	19	72	10,234	26,192	78,466	..	29	359
3. Ayr	320,238	783	879	44,892	140	701	16	47,411	9,958	6,484	591	660	38	223	17,954	87,479	167,165	..	168	61
4. Banff	160,075	..	9,550	48,347	50	140	41	58,128	2,043	21,647	4	16	934	6	24,650	67,233	9,972	1	13	78
5. Berwick	191,684	2,269	18,781	33,068	23	824	18	54,983	2,679	25,808	232	815	486	2	29,917	59,048	47,592	..	30	114
6. Bute	25,865	..	85	4,822	34	38	3	4,982	1,001	1,384	7	85	4	57	2,538	9,003	8,889	..	67	386
7. Caithness	111,098	..	1,021	33,007	116	4	29	34,177	1,708	13,200	2	40	422	4	15,376	31,393	28,000	..	9	48
8. Clackmannan	15,346	268	393	3,248	3	407	..	4,319	447	800	4	122	9	26	1,408	3,667	5,836	..	11	105
9. Dumbarton	50,766	702	173	6,956	2	125	3	7,961	2,481	1,374	26	227	35	16	4,159	16,821	21,718	..	66	41
10. Dumfries	257,619	77	664	41,892	..	14	11	42,658	3,797	17,333	382	1,060	32	46	22,650	79,726	112,500	..	64	21
11. Edinburgh	129,877	4,986	4,583	21,952	5	49	133	31,708	7,290	10,571	51	1,350	216	381	19,859	33,197	44,849	..	249	15
12. Elgin	100,795	550	12,865	21,864	650	26	17	35,972	2,115	15,047	9	19	336	18	17,544	38,201	8,942	1	22	113
13. Fife	254,314	10,827	20,214	39,258	846	984	6	72,135	16,889	22,540	35	566	580	78	40,688	64,260	76,572	..	201	458
14. Forfar	249,815	8,322	28,628	49,033	724	338	29	87,074	14,852	32,252	37	295	374	120	47,930	87,713	26,705	..	374	19
15. Haddington	111,918	5,141	15,038	17,241	4	330	95	37,849	9,157	14,891	200	650	147	315	25,360	27,813	20,495	..	368	33
16. Inverness	148,189	22	7,316	30,057	683	9	11	38,128	6,159	10,647	22	54	104	9	16,995	30,623	61,577	1	33	822
17. Kincardine	120,007	534	12,905	27,810	29	286	19	41,583	2,992	17,116	..	32	389	118	20,647	47,986	9,696	..	95	—
18. Kinross	35,344	46	336	6,556	40	22	..	7,000	760	2,623	1	111	43	8	3,546	11,714	13,044	..	31	9
19. Kirkcudbright	191,994	49	35	25,833	3	50	3	25,973	1,600	11,429	118	1,177	14	48	14,386	57,267	94,161	..	32	175
20. Lanark	256,076	2,096	268	37,374	73	380	13	40,204	4,923	9,349	26	2,133	164	360	16,955	81,649	115,041	..	1,919	308
21. Linlithgow	58,213	1,568	2,615	10,027	21	226	7	14,489	2,315	3,509	14	326	150	14	6,328	14,186	23,067	..	50	93
22. Nairn	25,578	..	3,461	5,333	92	1	6	8,893	337	4,256	7	11	35	3	4,649	9,665	2,318	..	5	48
23. Orkney	107,893	..	4,566	33,491	..	6	35	38,098	2,793	14,498	3	39	310	1	17,644	34,377	17,611	..	..	163
24. Shetland	57,894	..	1,417	7,888	17	..	1	9,323	2,858	1,475	..	699	2	..	5,034	1,708	41,453	..	..	376
25. Peebles	49,851	..	380	7,482	20	..	4	7,886	347	3,880	1	802	34	1	5,065	21,935	14,941	..	24	—
26. Perth	337,108	5,558	12,213	66,888	404	1,776	10	86,429	14,314	27,549	43	738	255	91	42,990	100,770	103,940	..	1,881	1,098
27. Renfrew	90,599	1,495	47	10,783	1	123	3	12,452	3,205	2,105	35	338	83	63	5,829	24,300	47,759	..	146	113
28. Ross & Cromarty	140,724	959	12,476	29,648	525	17	13	43,638	7,327	15,506	91	279	421	14	23,638	43,085	30,066	1	33	263
29. Roxburgh	182,962	521	11,979	28,187	43	276	10	41,016	1,886	20,515	51	749	221	89	22,911	49,405	69,500	..	67	3
30. Selkirk	29,601	5	221	4,702	5	..	1	4,934	196	2,491	..	96	45	2	2,830	9,087	12,737	..	11	2
31. Stirling	116,177	1,648	2,511	18,557	95	2,471	4	25,286	3,345	4,187	11	478	145	160	8,326	29,778	51,674	..	129	984
32. Sutherland	32,060	12	1,087	8,174	74	4	6	9,357	1,594	3,093	..	29	23	2	4,741	9,158	8,750	..	5	104
33. Wigtown	155,068	202	452	32,296	5	127	1	33,083	1,499	14,610	325	272	41	94	16,841	68,158	36,798	..	12	176
Total	4,880,985	48,641	212,134	962,972	5,598	10,346	910	1,240,601	144,265	445,300	2,889	14,725	8,557	2,699	617,941	1,558,277	1,450,726	4	6,488	6,948

TABLE No. 2.—ESTIMATED TOTAL PRODUCE OF WHEAT, BARLEY, AND OATS, ACREAGE and Estimated YIELD per Acre in the Year 1904, compared with the Estimated YIELD for the Years 1903 and 1902, and the AVERAGE of the Ten Years, 1894-1903, in each COUNTY of SCOTLAND.

COUNTIES.	WHEAT.						BARLEY, INCLUDING BERE.						OATS.					
	Estimated Total Produce in 1904.	Acreage in 1904.	Estimated Yield per Acre.			Average of the Ten Years, 1894-1903.	Estimated Total Produce in 1904.	Acreage in 1904.	Estimated Yield per Acre.			Average of the Ten Years, 1894-1903.	Estimated Total Produce in 1904.	Acreage in 1904.	Estimated Yield per Acre.			Average of the Ten Years, 1894-1903.
			1904.	1903.	1902.				1904.	1903.	1902.				1904.	1903.	1902.	
	Bush.	Acres.	Bush.	Bush.	Bush.	Bush.	Bush.	Acres.	Bush.	Bush.	Bush.	Bush.	Bush.	Acres.	Bush.	Bush.	Bush.	Bush.
Aberdeen	..	..	..	32.00	30.00	30.98	601,300	17,741	33.89	31.51	30.50	33.89	6,762,800	193,270	34.99	35.33	34.14	35.27
Argyll	..	..	..	..	37.00	..	43,326	1,318	32.87	29.01	27.40	30.76	573,593	17,669	32.46	29.96	31.82	30.69
Ayr	21,836	560	38.99	38.34	40.99	38.02	34,181	873	39.15	36.66	40.72	39.42	2,011,609	44,992	44.71	42.44	43.83	45.24
Banff	..	..	..	32.00	36.86	38.19	287,344	7,826	36.72	33.84	31.98	35.01	1,861,007	49,316	37.74	37.85	36.15	36.55
Berwick	51,662	1,375	37.57	35.85	36.98	34.79	757,562	19,600	38.65	36.87	37.16	36.04	1,369,557	32,975	41.53	40.15	39.55	37.66
Bute	..	..	..	..	..	..	1,316	35	37.60	34.05	39.92	39.88	172,977	4,734	36.54	36.94	32.13	35.06
Caithness	..	..	..	6.00	..	*18.97	25,377	868	29.24	25.47	31.52	29.29	1,027,701	33,603	30.58	25.78	31.55	30.72
Clackmannan	4,482	116	38.64	36.89	39.14	38.82	13,155	424	31.03	30.27	37.73	34.77	129,376	3,465	37.34	37.42	42.57	41.40
Dumbarton	25,560	675	37.87	33.75	38.04	38.75	6,980	181	38.56	31.27	37.39	40.81	287,596	7,046	40.82	33.98	41.19	40.50
Dumfries	2,534	68	37.26	37.00	38.63	38.18	24,524	648	37.85	35.63	35.56	36.15	1,416,918	41,553	34.10	32.31	35.87	33.86
Edinburgh	212,149	4,560	46.52	43.51	45.35	44.19	190,589	4,304	44.27	43.10	45.12	44.09	1,071,808	23,168	46.27	43.07	43.61	42.51
Elgin or Moray	19,992	526	38.01	37.70	37.32	37.51	378,248	12,336	30.64	34.00	35.22	34.56	717,279	22,466	31.93	39.18	39.88	37.66
Fife	304,338	8,494	35.83	33.36	36.83	35.40	733,974	20,159	36.41	33.48	36.25	36.13	1,573,341	40,927	38.44	42.23	43.45	40.10
Forfar	225,163	6,312	35.67	32.69	34.76	36.06	1,113,497	27,991	39.78	38.46	40.06	37.50	2,368,030	51,139	46.31	47.93	48.21	44.48
Haddington	189,348	4,467	42.39	40.32	41.83	40.11	660,943	15,397	42.93	39.28	42.74	41.63	810,248	17,302	46.83	43.39	46.85	43.88
Inverness	264	11	24.00	24.83	24.00	28.09	139,048	6,827	20.37	22.17	24.13	28.47	775,652	30,275	25.62	26.24	25.48	29.93
Kincardine	8,220	218	37.71	34.71	35.12	36.57	376,459	10,989	34.26	32.82	33.33	35.82	1,138,220	29,696	38.33	38.79	39.75	39.93
Kinross	180	5	36.00	30.00	36.82	*34.98	9,784	275	35.58	29.22	32.44	33.05	234,219	6,610	35.43	31.49	33.54	31.17
Kirkcudbright	1,175	36	32.64	31.42	34.80	33.88	1,691	55	30.75	31.85	33.07	33.91	852,118	26,149	32.59	35.41	37.63	34.42
Lanark	55,053	1,553	35.45	31.83	34.52	35.40	8,375	255	32.84	29.42	30.33	32.49	1,429,739	37,151	38.48	34.00	34.44	35.77
Linlithgow	54,701	1,258	43.48	43.16	41.79	41.21	124,112	2,818	44.04	43.61	44.34	44.00	459,618	10,191	45.10	43.69	45.07	43.10
Nairn	..	..	..	..	..	†31.41	84,038	3,286	25.57	30.96	32.35	32.40	145,656	5,505	26.46	36.25	37.22	35.51
Orkney	..	..	..	..	..	..	178,722	4,671	38.26	33.14	33.00	33.44	1,056,484	33,357	31.67	27.81	28.23	28.76
Peebles	..	..	..	32.00	32.00	31.10	12,036	337	35.72	32.57	37.56	33.88	275,572	7,660	35.98	33.94	37.20	33.70
Perth	154,785	4,007	38.63	35.16	39.12	38.20	444,690	11,712	37.97	37.66	38.06	35.59	2,621,955	68,281	38.40	39.04	40.46	36.24
Renfrew	44,575	1,107	40.27	39.54	41.02	40.03	2,700	70	38.57	43.05	42.05	41.78	446,798	11,029	40.51	38.24	44.50	42.50
Ross and Cromarty	14,140	539	26.23	29.24	30.37	35.37	327,124	11,667	28.04	29.88	32.46	35.08	881,454	31,192	28.26	30.94	33.07	35.66
Roxburgh	12,066	368	32.79	32.97	30.16	31.98	433,887	12,024	36.09	35.10	33.85	34.28	1,058,307	28,072	37.70	35.81	38.52	35.28
Selkirk	..	..	..	30.00	25.00	†29.17	5,404	193	28.00	27.11	24.00	28.40	178,980	4,710	38.00	35.00	32.00	33.40
Shetland	..	..	..	..	..	..	36,004	1,513	23.80	22.38	20.84	25.48	201,751	7,826	25.78	24.42	21.78	26.14
Stirling	46,418	1,309	35.46	33.78	37.22	36.62	83,909	2,633	31.87	32.02	37.65	35.29	692,397	18,766	36.90	36.85	40.82	39.83
Sutherland	..	..	..	25.00	..	..	22,065	1,074	20.54	22.11	26.90	27.61	188,525	8,241	22.88	23.70	27.73	27.15
Wigtown	4,918	158	31.09	29.79	27.52	28.35	18,923	614	30.82	31.23	29.68	31.82	1,112,052	32,408	34.31	33.62	33.26	33.70
Total	1,453,549	37,722	38.53	36.01	38.07	37.58	7,181,237	200,764	35.77	35.05	35.52	35.77	35,902,862	980,789	36.61	36.24	37.34	36.50

* Average of 8 years only.

† Average of 6 years only.

TABLE No. 3.—ESTIMATED TOTAL PRODUCE OF BEANS, PEAS, AND POTATOES, ACREAGE and Estimated YIELD per Acre in the Year 1904, compared with the Estimated YIELD for the Years 1903 and 1902, and the AVERAGE of the Ten Years, 1894-1903, in each COUNTY of SCOTLAND.

COUNTIES.	BEANS.						PEAS.						POTATOES.					
	Estimated Total Produce in 1904.	Acreage in 1904.	Estimated Yield per Acre.			Average of the Ten Years, 1894-1903.	Estimated Total Produce in 1904.	Acreage in 1904.	Estimated Yield per Acre.			Average of the Ten Years, 1894-1903.	Estimated Total Produce in 1904.	Acreage in 1904.	Estimated Yield per Acre.			Average of the Ten Years, 1894-1903.
			1904.	1903.	1902.				1904.	1903.	1902.				1904.	1903.	1902.	
	Bush.	Acres.	Bush.	Bush.	Bush.	Bush.	Bush.	Acres.	Bush	Bush.	Bush.	Bush.	Tons.	Acres.	Tons.	Tons.	Tons.	Tons.
Aberdeen	1,195	51	23.43	26.17	29.72	26.16	1033	57	18.12	19.84	18.69	22.34	49,020	7,391	6.63	4.40	3.90	4.86
Argyll	3,160	101	31.29	22.68	22.78	19.22	51	2	25.50	15.67	20.67	19.49	25,729	4,272	6.02	5.28	4.74	4.70
Ayr	24,519	720	34.05	29.75	33.88	33.91	414	12	34.50	32.10	34.68	33.80	77,612	9,457	8.21	7.25	8.58	6.83
Banff	3,090	105	29.43	17.71	24.56	25.46	709	30	23.63	17.51	23.11	21.69	19,005	2,102	9.04	5.68	4.86	5.81
Berwick	26,114	837	31.20	33.23	37.54	34.00	108	4	27.00	28.00	29.66	26.98	15,352	2,404	6.39	5.23	6.13	6.03
Bute	1,708	53	32.23	26.23	20.48	21.53	82	4	20.50	19.00	21.50	18.19	7,823	974	8.03	7.41	5.40	5.75
Caithness	89	18	4.94	6.00	7.83	7.85	162	27	6.00	5.50	5.58	9.43	12,293	1,686	7.29	4.70	6.06	5.09
Clackmannan	16,109	428	37.64	33.66	34.33	32.95	..	..	..	..	31.25	..	4,006	424	9.45	9.31	8.87	9.14
Dumbarton	2,990	119	25.13	20.26	22.11	23.80	97	4	24.25	19.40	21.00	21.82	18,541	2,549	7.27	6.30	8.16	7.47
Dumfries	29	1	29.00	27.00	30.48	28.40	101	4	25.25	25.40	21.50	22 41	24,771	3,655	6.78	5.92	6.28	6.07
Edinburgh	3,215	85	37.82	31.61	37.52	34.30	4,032	134	30.09	27.12	28.94	26.89	55,890	6,711	8.33	8.07	8.11	7.11
Elgin or Moray	899	35	25.69	26.92	28.34	29.25	641	27	23.74	25.17	22.38	24.66	12,608	1,993	6.33	5.44	5.61	5.34
Fife	38,847	1,069	36.34	34.88	35.58	34.21	830	25	33.20	34.55	20.92	29.56	118,642	15,831	7.49	4.62	6.09	5.14
Forfar	11,945	371	32.20	30.59	35.64	33.49	718	26	27.62	31.11	28.47	27.69	104,706	13,305	7.87	5.98	6.74	5.83
Haddington	12,318	341	36.12	35.13	39.84	35.72	3,309	93	35.58	29.33	32.18	27.98	70,585	9,041	7.81	7.22	6.94	6.68
Inverness	270	15	18.00	16.00	17.44	*18.24	198	10	19.80	16.36	16.41	21.24	26,381	6,001	4.40	3.99	4.16	3.84
Kincardine	12,898	377	34.19	34.56	34.37	36.44	642	22	29.18	32.00	31.87	28.98	17,150	2,510	6.83	4.43	4.41	5.46
Kinross	578	17	34.00	24.00	30.00	32.39	..	..	..	..	21.00	..	6,266	713	8.79	5.25	5.72	5.61
Kirkcudbright	960	33	29.09	31.00	34.97	31.62	50	2	25.00	22.25	27.83	27.53	11,312	1,569	7.21	5.56	6.49	5.29
Lanark	15,913	472	33.71	26.56	28.90	31.31	482	20	24.10	23.17	22.97	27.00	38,495	4,645	8.29	6.76	7.53	7.28
Linlithgow	7,940	227	34.98	31.86	36.04	33.46	165	5	33.00	28.00	32.13	27.51	16,903	2,248	7.52	7.82	8.14	7.04
Nairn	..	..	..	..	..	..	153	12	12.75	18.50	20.00	*21.86	1,888	338	5.59	4.88	4.94	4.43
Orkney	..	..	..	..	..	..	..	..	..	..	..	..	18,682	2,733	6.84	4.93	5.87	6.40
Peebles	..	..	..	..	..	..	84	3	28.00	26.32	27.00	24.83	2,505	329	7.61	5.86	7.22	6.55
Perth	68,971	1,847	37.34	32.28	35.88	34.05	402	14	28.71	30.87	29.97	29.92	109,260	13,678	7.99	5.67	7.62	6.06
Renfrew	7,278	184	39.55	37.62	39.63	39.13	..	..	..	35.87	35.87	36.40	23,182	3,172	7.29	7.48	8.00	7.05
Ross and Cromarty	16	1	16.00	16.33	16.20	18.63	97	7	13.86	15.15	16.03	19.51	30,280	7,301	4.15	3.89	3.49	3.26
Roxburgh	10,812	325	33.27	28.41	33.48	31.42	386	14	27.57	26.67	30.35	28.24	8,630	1,292	6.68	5.84	5.80	5.56
Selkirk	..	..	..	..	30.00	..	..	..	..	26.00	28.00	26.83	1,000	200	5.00	4.00	5.00	4.48
Shetland	..	..	..	..	..	..	..	..	..	..	..	..	11,726	2,872	4.08	3.04	3.58	4.01
Stirling	86,697	2,543	34.09	30.88	32.99	31.28	119	5	23.80	22.67	23.96	26.48	26,177	3,212	8.15	6.95	8.02	7.48
Sutherland	41	6	6.83	..	15.50	†16.38	45	4	11.25	12.00	15.53	16.09	7,416	1,618	4.58	3.87	4.42	3.60
Wigtown	4,488	134	33.49	26.22	26.98	29.74	265	8	33.12	29.00	27.71	29.20	7,882	1,509	5.22	5.00	5.06	4.37
Total	363,079	10,515	34.53	31.24	33.99	32.68	15,375	575	26.74	26.20	25.04	25.38	981,677	137,785	7.13	5.64	6.27	5.67

TABLE No. 4.—ESTIMATED TOTAL PRODUCE of TURNIPS (including SWEDES) and MANGELS, ACREAGE and Estimated YIELD per Acre in the Year 1904, compared with the Estimated YIELD for the Years 1903 and 1902, and the AVERAGE of the Ten Years, 1894-1903, in each COUNTY of SCOTLAND.

COUNTIES.	TURNIPS.						MANGELS.					
	Estimated Total Produce in 1904.	Acreage in 1904.	Estimated Yield per Acre.			Average of the Ten Years, 1894-1903.	Estimated Total Produce in 1904.	Acreage in 1904.	Estimated Yield per Acre.			Average of the Ten Years, 1894-1903.
			1904.	1903.	1902.				1904.	1903.	1902.	
	Tons.	Acres.	Tons.	Tons.	Tons.	Tons.	Tons.	Acres.	Tons.	Tons.	Tons.	Tons.
Aberdeen	1,883,470	88,805	15.58	11.73	12.14	13.68	27	2	13.50	11.33	13.50	11.64
Argyll	98,804	5,551	17.80	11.15	13.85	13.15	477	42	11.36	6.84	7.26	8.54
Ayr	118,721	6,598	18.16	15.90	22.00	17.75	11,093	606	18.31	15.11	18.94	18.06
Banff	478,822	21,871	21.89	12.16	16.09	15.62	58	6	9.67	6.00	6.57	†11.55
Berwick	441,780	26,410	16.78	13.89	16.84	15.39	3,557	273	13.03	13.61	14.40	17.09
Bute	29,120	1,339	21.28	11.41	17.62	16.59	137	8	17.12	15.80	14.18	12.23
Caithness	187,215	13,315	14.06	9.57	15.39	13.14	24	4	6.00	5.40	7.00	† 8.29
Clackmannan	10,771	794	13.57	9.78	11.67	10.56	49	5	9.80	9.86	9.25	9.41
Dumbarton	24,648	1,874	17.97	12.81	19.03	17.40	599	33	18.15	11.64	15.56	15.39
Dumfries	283,827	17,046	16.65	12.72	17.87	14.98	6,622	469	14.12	16.93	17.68	20.66
Edinburgh	222,375	10,785	20.62	18.68	19.92	18.24	1,139	49	23.24	21.59	20.21	18.75
Elgin or Moray	302,297	15,140	19.97	14.77	18.10	16.47	729	39	18.69	14.27	17.51	16.60
Fife	485,960	23,421	20.88	11.85	16.07	13.19	708	64	11.06	8.54	13.72	13.05
Forfar	700,315	33,230	21.07	15.72	18.81	17.16	1,476	77	19.17	13.60	15.64	21.39
Haddington	300,501	15,192	19.80	17.85	18.51	17.80	6,480	298	21.74	18.24	20.21	18.38
Inverness	98,500	10,750	9.16	8.20	8.85	10.30	191	20	9.55	7.33	7.97	10.83
Kincardine	254,535	17,598	14.46	10.32	13.85	14.14	16	1	10.00	10.00	15.00	‡14.10
Kinross	49,454	2,715	18.22	14.10	15.71	14.02	24	3	8.00	6.00	8.00	—
Kirkcudbright	235,795	11,440	20.61	14.04	18.88	16.64	2,342	117	20.02	15.31	16.09	17.42
Lanark	183,502	9,498	19.33	21.78	19.96	19.38	490	45	10.89	14.54	11.98	12.67
Linlithgow	74,388	3,544	20.99	15.13	18.26	16.68	546	33	16.55	16.14	18.14	15.09
Nairn	73,673	4,135	17.82	15.52	16.95	15.27	206	13	15.85	14.50	14.88	†14.92
Orkney	160,053	14,494	11.04	8.14	11.00	9.26	..	..	..	..	*..	‡ 0.29
Peebles	76,595	3,889	19.69	18.66	22.00	17.70	97	5	19.40	14.00	16.20	—
Perth	564,351	28,193	20.02	13.67	18.38	14.97	741	73	10.15	8.27	13.89	11.12
Renfrew	36,286	2,219	16.35	13.92	15.58	16.04	849	61	13.92	12.88	13.09	14.95
Ross and Cromarty	125,330	15,487	8.09	7.76	8.59	9.85	1,079	113	9.55	6.97	7.83	10.43
Roxburgh	370,459	20,662	17.93	18.52	18.55	15.64	1,300	95	13.68	12.44	17.88	18.04
Selkirk	43,656	2,568	17.00	15.00	14.00	13.06	42	3	14.00	12.00	12.00	—
Shetland	18,028	1,468	12.28	10.14	14.56	15.04	..	..	..	..	..	—
Stirling	60,600	4,258	14.23	10.91	15.03	13.53	406	29	14.00	11.80	13.59	13.12
Sutherland	21,760	3,036	7.17	6.64	7.84	8.30	..	..	..	6.00	7.00	—
Wigtown	275,291	14,926	18.44	16.60	18.08	15.87	6,848	338	17.87	17.65	18.99	17.95
Total	7,794,380	451,721	17.25	13.26	15.67	14.69	48,347	2,969	16.28	14.84	16.68	17.10

TABLE No. 5.—ESTIMATED TOTAL PRODUCE OF HAY from Clover, Sainfoin, and Grasses under Rotation, also Total from Permanent Pasture, ACREAGE, and Estimated YIELD per Acre in the Year 1904, compared with the Estimated YIELD for the Years 1903 and 1902, and the AVERAGE of the Ten Years, 1894-1903, in each COUNTY of SCOTLAND.

COUNTIES.	FROM CLOVER, SAINFOIN, AND GRASSES.						FROM PERMANENT PASTURE.					
	Estimated Total Produce in 1904.	Acreage in 1904.	Estimated Yield per Acre.			Average of the Ten Years, 1894-1903.	Estimated Total Produce in 1904.	Acreage in 1904.	Estimated Yield per Acre.			Average of the Ten Years, 1894-1903.
			1904.	1903.	1902.				1904.	1903.	1902.	
	Cwt.	Acres.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Acres.	Cwt.	Cwt.	Cwt.	Cwt.
Aberdeen	63,884	48,752	26.21	26.33	30.51	27.59	1,324	1,499	17.67	12.77	18.87	19.36
Argyll	17,079	11,234	30.41	25.85	29.22	29.12	23,876	15,311	31.19	25.77	28.74	28.70
Ayr	59,976	33,876	35.41	30.33	31.86	33.71	36,385	17,086	42.59	35.18	41.40	36.86
Banff	11,028	10,012	22.03	19.15	28.75	27.65	722	748	19.32	20.84	21.21	20.69
Berwick	18,072	10,428	34.66	31.57	35.01	31.11	1,532	1,006	30.45	29.94	29.57	25.98
Bute	3,812	2,173	35.08	31.59	32.66	33.59	1,527	904	33.78	27.80	19.38	28.08
Caithness	4,305	9,351	9.21	10.95	15.44	21.18	482	2,509	3.84	8.86	5.87	9.10
Clackmannan	3,636	1,843	39.46	37.75	38.63	35.55	1,550	905	34.25	32.90	26.49	27.79
Dumbarton	13,404	7,014	38.22	32.80	35.70	38.04	3,148	1,581	39.83	37.31	37.73	40.70
Dumfries	21,826	16,990	25.69	20.28	26.23	26.19	29,242	18,860	31.01	27.42	33.25	31.09
Edinburgh	45,214	13,338	67.80	54.02	60.89	56.64	3,773	2,141	35.25	31.69	35.04	33.41
Elgin or Moray	6,995	5,731	24.40	24.07	29.55	26.72	532	534	19.92	19.66	28.15	22.13
Fife	56,299	27,879	40.39	29.41	31.65	31.13	7,710	4,568	33.75	27.55	27.60	26.54
Forfar	40,117	22,371	35.87	31.70	34.67	37.07	1,805	1,487	24.28	28.89	25.66	28.02
Haddington	32,915	10,897	60.41	51.90	57.56	52.52	2,205	1,373	32.12	26.40	31.33	29.82
Inverness	10,381	11,654	17.81	18.00	19.98	20.11	6,480	5,931	21.85	10.96	22.57	18.85
Kincardine	17,206	13,710	25.10	25.38	29.77	28.69	279	388	14.38	14.75	17.04	18.67
Kinross	4,918	2,844	34.59	24.24	32.09	27.81	1,594	869	36.68	27.77	33.74	31.18
Kirkcudbright	14,485	9,921	29.20	22.34	27.88	26.98	17,663	12,674	27.87	24.52	24.85	25.28
Lanark	71,562	36,108	39.64	34.81	37.01	30.33	19,495	10,407	37.47	31.92	36.03	35.41
Linlithgow	24,402	7,441	65.59	52.36	58.05	57.25	2,849	1,587	35.91	31.12	30.04	30.26
Nairn	2,076	2,290	18.13	16.19	21.38	20.78	49	71	13.90	13.48	14.29	16.69
Orkney	7,186	8,070	17.81	17.85	19.46	20.40	297	*698	8.50	8.36	8.93	10.14
Peebles	5,382	2,523	42.67	33.27	35.93	31.68	1,770	1,084	32.65	34.05	37.73	30.58
Perth	51,697	32,433	31.88	27.04	32.81	30.22	14,787	11,785	25.09	22.17	23.57	24.58
Renfrew	27,871	13,698	40.70	32.94	39.08	37.98	14,590	6,017	48.50	42.90	49.20	45.59
Ross and Cromarty	10,770	14,212	15.16	16.14	17.28	18.40	767	2,421	6.34	7.11	7.15	8.10
Roxburgh	15,404	8,911	34.57	29.77	37.31	31.91	10,194	6,471	31.51	28.87	31.93	27.62
Selkirk	1,880	1,074	35.00	26.00	34.00	28.90	2,571	1,607	32.00	28.00	32.00	24.90
Shetland	613	910	13.48	16.70	13.94	19.77	1,294	1,713	15.11	15.09	10.97	16.22
Stirling	24,533	13,193	37.19	34.61	37.53	34.81	8,417	4,957	33.96	34.96	33.46	32.97
Sutherland	2,775	4,085	13.58	14.71	16.96	17.35	364	1,281	5.66	6.07	7.08	8.63
Wigtown	7,640	4,357	35.07	31.37	35.44	33.96	4,893	4,453	21.98	18.66	20.88	20.87
Total	701,854	421,866	33.31	28.94	33.21	31.88	224,116	144,939	30.93	27.46	30.17	28.87

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* This Acreage is less than that stated in some other Tables by 853 acres, which were originally returned for the county of Orkney as "Grass for Hay," but were subsequently stated to have been used for grazing.

TABLE No. 6.—NUMBER OF HORSES, CATTLE, SHEEP, AND PIGS IN EACH COUNTY OF SCOTLAND AS RETURNED ON JUNE 5, 1905.

COUNTIES.	HORSES (including Ponies).				CATTLE				SHEEP			PIGS.
	Used solely for Agriculture, &c *	Unbroken Horses.		Total.	Cows and Heifers in Milk or in Calf.	Other Cattle.		Total.	1 Year Old and above.	Under 1 Year.	Total.	
		1 Year and above	Under 1 Year.			2 Years and above	Under 2 Years.					
1. Aberdeen	23,271	6,308	2,387	31,966	42,472	42,546	82,678	167,696	115,585	87,238	202,823	12,142
2. Argyll	4,496	1,434	499	6,429	22,693	13,351	25,968	62,012	563,265	279,439	842,704	4,236
3. Ayr	7,577	1,634	520	9,731	51,354	14,082	35,118	100,554	218,294	141,683	359,977	11,332
4. Banff	6,726	1,752	704	9,182	12,426	7,033	23,572	43,031	35,291	26,416	61,707	8,253
5. Berwick	4,450	805	234	5,489	3,148	7,185	10,391	20,724	167,027	154,247	321,274	3,847
6. Bute	956	202	75	1,233	3,681	1,578	4,345	9,604	27,633	14,422	42,055	533
7. Caithness	4,417	929	423	5,769	7,601	2,704	11,540	21,845	76,383	49,768	126,151	1,605
8. Clackmannan	530	137	64	731	1,330	966	1,369	3,665	8,544	5,944	14,488	1,142
9. Dumbarton	1,456	277	82	1,815	3,581	2,345	8,723	14,649	43,314	25,693	69,007	1,160
10. Dumfries	6,007	1,590	560	8,157	21,481	13,849	29,929	65,259	337,015	222,062	559,077	8,384
11. Edinburgh	3,838	559	179	4,576	11,766	3,893	4,854	20,513	107,029	75,083	182,112	3,528
12. Elgin	3,808	964	381	5,153	6,641	4,166	12,390	23,197	32,606	21,226	53,832	2,606
13. Fife	7,060	1,826	570	10,356	12,387	19,586	19,162	51,135	59,820	45,860	105,680	4,996
14. Forfar	8,507	1,238	487	10,232	12,761	22,863	20,001	55,625	95,133	70,300	165,433	6,881
15. Haddington	3,304	278	125	3,707	2,057	6,552	4,313	12,922	74,480	53,542	128,022	2,051
16. Inverness	7,114	1,532	878	9,524	21,712	6,608	21,760	50,080	360,096	177,536	537,632	2,350
17. Kincardine	4,057	704	281	5,042	6,659	6,999	11,773	25,431	25,487	19,538	45,025	2,554
18. Kinross	854	261	105	1,220	1,407	1,389	4,358	7,154	19,507	15,033	34,540	621
19. Kirkcudbright	4,116	1,241	419	5,776	16,732	14,280	21,094	52,106	239,084	153,179	392,263	8,414
20. Lanark	6,831	1,379	538	8,748	40,527	11,846	22,870	75,243	154,003	92,218	246,221	6,876
21. Linlithgow	1,685	352	152	2,189	5,011	3,291	4,126	12,428	15,143	6,888	22,031	1,531
22. Nairn	1,062	331	89	1,482	2,008	666	3,545	6,219	12,711	5,807	18,518	616
23. Orkney	5,391	1,117	631	7,139	9,928	3,722	15,655	29,305	16,839	15,896	32,735	2,514
24. Shetland	3,465	1,633	1,163	6,261	8,250	3,729	5,903	17,882	87,892	51,671	139,563	1,472
25. Peebles	888	163	64	1,115	2,092	1,898	3,726	7,716	114,221	85,594	199,815	550
26. Perth	10,447	2,040	785	13,272	18,276	20,427	39,413	78,116	426,535	239,293	665,828	7,126
27. Renfrew	2,701	575	157	3,433	17,383	3,067	5,880	26,330	22,595	15,857	38,452	1,079
28. Ross and Cromarty	6,016	1,373	590	7,979	17,827	8,145	19,030	45,002	172,540	92,357	264,897	4,290
29. Roxburgh	3,773	385	131	4,289	4,839	6,368	9,503	20,710	291,479	240,409	531,888	2,835
30. Selkirk	606	70	11	687	1,310	495	1,789	3,594	103,683	81,281	184,964	536
31. Stirling	3,630	983	336	4,949	12,456	8,811	12,353	33,620	73,806	47,478	121,284	2,048
32. Sutherland	2,218	262	122	2,602	5,709	1,833	4,825	12,367	129,607	66,909	196,516	660
33. Wigtown	4,363	1,230	560	6,153	24,633	10,057	16,871	51,561	75,097	42,600	117,697	11,446
Total	156,520	35,564	14,302	206,386	437,138	276,330	513,827	1,227,295	4,301,744	2,722,467	7,024,211	130,214

* Including Mares kept for breeding.

Table No. 7.—Quantity and Value of Corn, &c., imported into the United Kingdom in the undermentioned Years.

[From Trade and Navigation Returns.]

	Quantities.			Values.		
	1903.	1904.	1905.	1903.	1904.	1905.
Wheat from—	Cwt.	Cwt.	Cwt.	£	£	£
Russia . . .	17,176,300	23,529,500	24,703,200	5,809,308	8,444,134	9,142,146
Germany . . .	310,176	251,000	300,000	105,554	91,351	111,745
Turkey . . .	433,004	431,200	244,800	134,985	127,263	80,217
Roumania . . .	3,140,727	1,491,800	2,082,200	1,055,912	512,001	752,916
United States—						
Atlantic Ports .	18,419,336	4,948,400	5,082,000	6,395,154	1,763,362	1,881,545
Pacific Ports .	5,778,559	2,103,200	1,552,700	2,048,960	754,063	572,030
Chile	288,644	915,400	162,800	83,623	327,308	57,672
Argentine Republic .	14,120,454	21,440,400	23,236,400	4,699,833	7,522,331	8,282,388
British East Indies .	17,057,857	25,493,000	22,807,422	5,653,066	8,498,529	7,882,937
Australia . . .	26	10,272,600	10,064,700	10	3,754,402	3,800,260
New Zealand . .	204	358,100	339,900	46	123,633	119,160
Canada . . .	10,802,127	6,195,300	6,522,030	3,737,368	2,229,791	2,412,137
Other countries . .	653,616	352,600	524,600	216,372	118,253	184,775
Total . .	88,131,030	97,782,500	97,622,752	29,940,191	34,266,416	35,279,928
Wheat and flour, from—						
Germany . . .	37,020	264,740	479,300	17,481	142,710	262,610
France . . .	577,498	1,436,920	1,034,503	238,708	647,426	472,286
Austria-Hungary .	817,879	733,294	622,885	471,025	430,253	389,381
United States . .	16,223,639	8,252,602	5,685,413	7,618,091	4,095,749	2,896,817
Canada . . .	2,687,617	2,045,767	1,330,100	1,253,250	1,014,124	653,804
Other countries . .	307,795	1,939,570	2,802,557	125,097	928,338	1,870,347
Total . .	20,601,448	14,722,893	11,954,763	9,723,652	7,258,600	6,044,745
Barley	26,555,867	27,152.300	21,426,900	7,221,789	7,161,600	6,017,350
Oats	16,283,763	14,097,700	17,095,463	4,263,950	3,726,121	4,713,265
Peas	1,829,923	2,179,506	2,015,876	690,768	767,097	724,757
Beans	1,765,700	1,862,686	1,225,050	594,832	577,094	414,227
Indian corn or maize .	50,099,328	42,897,880	42,101,210	12,465,583	10,247,134	11,034,748
Indian corn meal . .	590,416	316,660	459,188	176,622	100,940	144,829
Oatmeal	728,973	648,770	633,199	537,415	456,593	463,293
Offals of corn and grain, including rice-meal	2,617,966	3,136,560	3,129,810	536,272	591,242	638,915
Rice, exclusive of rice-meal—						
From Brit. East Indies	3,491,506	4,372,743	4,078,406	1,453,185	1,597,399	1,586,587
From other countries	1,199,414	1,395,262	1,529,832	597,315	671,945	739,855
Other kinds of grain and corn	1,737,076	1,564,170	1,595,214	540,634	475,304	532,641
Other kinds of meal and flour	87,498	96,264	117,273	35,869	38,590	48,827
Total of corn, &c.	..	..	..	68,778,077	67,936,074	68,383,967

Table No. 8.—Return of the Average Prices of Wool in the Years 1903 and 1904.

Years.	Australian.	South African.	English Fleeces.
	Per lb. s. d.	Per lb. s. d.	Per lb. s. d. s. d.
1903	0 9⅞	0 7½	0 6½ " 0 11½
1904	0 10	0 7⅝	0 8⅞ " 0 11¾

TABLE No. 9.—QUANTITIES AND VALUES OF CORN, MEAT, FOOD PRODUCTS,
in the Year 1905, with the

[*From Trade and*

	Quantities.			Values.		
	1903.	1904.	1905.	1903.	1904.	1905.
ANIMALS, LIVING:—	No.	No.	No.	£	£	£
Cattle	522,546	549,532	565,139	9,209,122	9,736,436	9,605,806
Sheep and lambs	354,241	382,240	183,084	546,063	591,984	278,753
Swine	..	..	150	..	..	300
Total value	..	..	..	9,755,185	10,328,420	9,944,859
AIN, FLOUR, &c.—	Cwt.	Cwt.	Cwt.	£	£	£
Wheat	98,131,030	97,782,500	97,622,752	29,940,191	34,266,416	35,279,928
Wheat meal and flour	20,601,448	14,722,893	11,954,763	9,723,652	7,258,600	6,044,745
Barley	26,555,867	27,152,300	21,426,900	7,221,789	7,161,600	6,017,350
Oats	16,283,763	14,097,700	17,095,463	4,263,950	3,726,120	4,713,265
Peas	1,829,923	2,179,506	2,015,876	690,768	767,097	724,757
Beans	1,765,700	1,862,686	1,225,050	594,832	577,094	414,227
Maize or Indian corn	50,099,328	42,897,880	42,101,210	12,465,583	10,247,134	11,034,748
Maize-meal	590,416	316,660	459,188	176,622	100,940	144,829
Oatmeal	728,973	648,770	633,199	537,415	456,593	403,293
Offals of corn and grain, including rice-meal	2,617,966	3,316,560	3,120,810	536,272	591,242	638,915
Rice, exclusive of rice-meal—						
From British East Indies	3,491,506	4,372,777	4,078,406	1,453,185	1,597,399	1,586,587
From other countries	1,199,414	1,395,262	1,529,832	597,315	671,945	739,855
Other kinds of grain & corn	1,737,076	1,564,170	1,595,214	540,684	475,304	532,641
Other kinds of meal and flour	87,498	96,264	117,273	35,869	38,590	48,827
Total value	..	..	..	68,778,077	67,936,074	68,383,967
MEAT:—	Cwt.	Cwt.	Cwt.	£	£	£
Beef, salted	173,692	144,304	142,806	245,605	187,288	202,417
" fresh	4,159,606	4,350,031	5,037,521	8,366,141	8,058,341	8,911,593
Mutton, fresh	4,016,622	3,494,782	3,810,969	7,826,062	6,861,531	7,336,480
Bacon	5,156,988	5,452,311	5,498,960	13,619,140	12,832,142	12,774,855
Hams	1,141,332	1,244,003	1,318,301	3,142,574	3,104,999	3,118,372
Pork, salted (not bacon or hams)	237,574	243,842	205,965	319,256	294,080	252,606
Pork, fresh	705,844	610,485	505,633	1,555,452	1,378,467	1,162,370
Meat, unenumerated—salted or fresh	668,261	631,012	670,144	1,206,052	1,164,442	1,225,692
Meat preserved otherwise than by salting	767,563	813,018	833,029	2,435,777	2,458,591	2,647,189
Rabbits	475,645	533,698	656,078	723,881	780,737	835,929
Total of dead meat	17,498,127	17,517,486	18,679,406	39,439,940	37,120,618	38,467,503
DAIRY PRODUCE:—	Cwt.	Cwt.	Cwt.	£	£	£
Butter	4,060,694	4,241,005	4,147,864	20,798,707	21,117,162	21,585,622
Margarine	882,123	960,278	1,088,189	2,313,618	2,494,467	2,736,286
Cheese	2,694,358	2,554,297	2,442,660	7,054,710	5,843,770	6,339,742
Total	7,637,175	7,755,580	7,678,713	30,167,035	29,455,399	30,661,650

AND ARTICLES AFFECTING AGRICULTURE, imported into the United Kingdom Corresponding Figures for 1903 and 1904.

Navigation Returns.]

	Quantities.			Values.		
	1903.	1904.	1905.	1903.	1904.	1905.
*POULTRY (alive or dead)	..	..	..	£ 1,202,288	£ 1,089,145	£ 906,391
*GAME (alive or dead)					128,132	98,089
Eggs	Gt. Hunds. 19,818,894	Gt. Hunds. 19,942,594	Gt. Hunds. 18,814,261	6,617,599	6,730,574	6,812,476
Total value	..	..	..	7,519,857	7,947,851	7,811,056
FRUIT, VEGETABLES, &c. :—						
Apples	Cwt. 4,569,546	Cwt. 3,771,781	Cwt. 3,494,650	£ 2,781,643	£ 2,118,294	£ 2,065,193
Cherries	110,192	260,724	186,682	167,142	319,824	253,012
Plums	594,626	493,707	480,291	622,268	526,438	524,673
Pears	271,518	535,614	417,654	326,463	503,573	407,679
Grapes	684,084	853,572	700,049	715,057	827,634	761,632
Oranges	6,176,752	5,853,254	5,068,526	2,275,400	2,193,146	1,949,491
Lemons	978,318	989,296	837,028	406,728	408,500	419,049
Unenumerated	688,873	654,765	502,096	449,413	372,575	354,140
Onions	8,619,919	8,292,136	7,585,951	1,003,016	1,076,472	1,094,698
Potatoes	9,150,202	9,903,9[illegible]5	3,664,294	2,603,238	2,487,971	1,404,607
Vegetables, unenumerated (raw)	..	..	..	396,784	457,491	419,752
Hops	113,998	313,667	108,953	578,739	1,839,854	456,280
Total value	..	..	..	12,825,891	13,081,772	10,110,231
OTHER ARTICLES :—						
Lard	Cwt. 1,732,790	Cwt. 1,830,837	Cwt. 2,012,305	£ 3,870,774	£ 3,342,389	£ 3,692,578
Wool, sheep and lambs'	Lb. 599,500,982	Lb. 561,677,833	Lb. 615,708,727	20,622,523	20,366,030	23,821,359
Wood and timber—	Loads.	Loads.	Loads.			
Hewn (pit-props or pit-wood)	2,321,348	2,332,577	2,120,116	2,535,365	2,485,113	2,237,745
Sawn or split, planed or dressed	6,742,233	6,066,236	5,985,785	18,192,519	15,505,799	15,253,180
Staves	129,773	132,176	119,182	570,859	525,696	553,092
Oilseed-cake	Tons. 307,791	Tons. 371,809	Tons. 357,577	2,165,430	2,128,817	2,206,290
Seeds—						
Clover and grass	Cwt. 458,046	Cwt. 426,475	Cwt. 316,111	1,008,772	869,838	651,712
Cotton	Tons. 537,491	Tons. 468,653	Tons. 568,928	2,984,096	2,537,499	2,973,259
Flax or linseed	Qrs. 2,185,694	Qrs. 2,785,983	Qrs. 1,923,940	4,179,727	4,502,064	3,541,163
Rape	308,296	309,325	178,098	417,271	386,420	280,290
Bones (whether burnt or not)	Tons. 52,996	Tons. 35,103	Tons. 47,346	232,592	158,373	209,913
Guano	32,801	24,276	29,223	180,891	117,758	138,966
Cotton, raw	Cwt. 16,909,813	Cwt. 17,454,897	Cwt. 19,674,957	44,836,116	54,697,788	52,182,656
Hemp	Tons. 116,717	Tons. 132,425	Tons. 121,907	3,551,431	4,121,755	3,762,885
Flax	94,601	74,917	90,098	3,675,664	3,185,475	3,581,808
Hides untanned—						
Dry	Cwt. 291,670	Cwt. 325,268	Cwt. 351,662	877,663	940,604	1,078,014
Wet	493,748	449,580	508,475	1,229,727	1,106,360	1,322,890
Petroleum	Gallons. 285,362,633	Gallons. 302,132,143	Gallons. 300,110,335	5,295,351	5,839,033	5,423,115

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* Not registered separately prior to 1904.

TABLE No. 10.—QUANTITY AND VALUE OF DEAD MEAT imported into the United Kingdom in the undermentioned Years.

[From Trade and Navigation Returns.]

	Quantities.			Values.		
	1903.	1904.	1905.	1903.	1904.	1905.
	Cwt.	Cwt.	Cwt.	£	£	£
BACON, from—						
Denmark . . .	1,496,101	1,723,884	1,471,687	4,294,017	4,532,420	3,978,317
Canada . . .	665,249	829,883	1,191,390	1,691,687	1,865,159	2,751,714
United States . .	2,893,507	2,806,108	2,755,233	7,370,928	6,209,009	5,828,392
Other countries . .	102,131	92,436	80,650	262,508	225,554	216,432
Total . .	5,156,988	5,452,311	5,498,960	13,619,140	12,832,142	12,774,855
BEEF (salted), from—						
United States . .	165,176	135,280	134,987	232,293	173,098	190,839
Other countries . .	8,516	9,024	7,819	13,312	14,190	11,578
Total . .	173,692	144,304	142,806	245,605	187,288	202,417
BEEF (fresh), from—						
United States . .	2,693,920	2,395,836	2,232,206	5,739,750	5,130,286	4,814,611
Argentine Republic .	1,152,211	1,675,271	2,580,152	2,053,669	2,482,704	3,751,780
Australia . . .	77,656	76,345	19,025	122,511	105,779	30,748
New Zealand . .	159,830	175,012	145,338	271,247	281,046	208,992
Other countries . .	75,989	27,567	60,800	178,964	58,526	105,462
Total . .	4,159,606	4,350,031	5,037,521	8,366,141	8,058,341	8,911,593
HAMS, from—						
Canada . . .	197,497	196,732	292,173	524,542	485,527	698,463
United States . .	939,169	1,042,659	1,022,854	2,602,654	2,606,129	2,409,993
Other countries . .	4,666	4,612	3,274	15,378	13,343	9,916
Total . .	1,141,332	1,244,003	1,318,301	3,142,574	3,104,999	3,118,372
MEAT (unenumerated, salted or fresh), from—						
Holland . . .	269,541	265,395	253,103	571,762	584,725	573,338
United States . .	179,212	132,539	166,088	283,766	210,624	255,921
Other countries . .	214,508	233,078	250,953	350,524	369,093	396,433
Total . .	663,261	631,012	670,144	1,206,052	1,164,442	1,225,692
MEAT, preserved otherwise than by salting—						
Beef	472,615	556,918	598,124	1,511,846	1,611,693	1,790,596
Mutton . . .	49,154	35,877	30,111	106,323	85,458	77,112
Other sorts . .	245,794	220,223	204,794	817,608	761,440	779,481
Total . .	767,563	813,018	833,029	2,435,777	2,458,591	2,647,189
MUTTON (fresh), from—						
Holland . . .	257,521	265,702	235,172	580,673	605,225	539,672
Australia . . .	181,269	163,014	505,413	365,384	324,239	988,049
New Zealand . .	2,035,434	1,626,893	1,524,981	4,153,269	3,391,025	3,164,712
Argentine Republic .	1,485,770	1,422,397	1,462,437	2,603,931	2,491,210	2,458,915
Other countries . .	56,628	16,776	82,966	122,805	49,832	185,132
Total . .	4,016,622	3,494,782	3,810,969	7,826,062	6,861,531	7,336,480
PORK (salted, not Bacon or Hams), from—						
United States . .	90,849	76,977	72,528	158,318	119,423	111,082
Other countries . .	146,725	166,865	133,437	160,938	174,657	141,524
Total . .	237,574	243,842	205,965	319,256	294,080	252,606
PORK (fresh), from—						
Holland . . .	527,269	448,154	306,379	1,122,202	1,005,450	713,523
Belgium . . .	39,745	32,798	39,344	97,990	83,061	97,439
United States . .	132,695	119,259	135,233	319,634	262,450	292,390
Other countries . .	6,135	10,274	24,677	15,626	27,506	59,018
Total .	705,844	610,485	505,633	1,555,452	1,378,467	1,162,370
RABBITS (dead), from—						
Belgium . . .	68,716	77,407	69,624	197,950	224,791	199,777
Australia . . .	243,864	322,833	482,697	285,718	357,710	485,935
New Zealand . .	134,171	107,147	80,289	159,757	121,799	82,496
Other countries . .	28,894	26,311	23,468	80,456	76,437	67,721
Total . .	475,645	533,698	656,078	723,881	780,737	835,929
Total of dead meat	17,498,127	17,517,486	18,679,406	39,439,940	37,120,618	38,467,503

TABLE No. 11.—QUANTITIES AND VALUES OF BUTTER, MARGARINE, CHEESE, AND EGGS imported into the United Kingdom in each Year from 1903 to 1905 inclusive.

[*From Trade and Navigation Returns.*]

	Quantities.			Values.		
	1903.	1904.	1905.	1903.	1904.	1905.
BUTTER from—	Cwt.	Cwt.	Cwt.	£	£	£
Russia . .	484,328	404,717	461,140	2,190,560	1,817,736	2,246,503
Sweden . .	212,232	206,791	188,209	1,108,980	1,062,353	1,021,603
Denmark .	1,771,654	1,708,619	1,630,363	9,572,439	9,003,089	8,919,766
Germany .	12,507	4,080	5,372	65,165	20,547	27,169
Holland . .	343,761	252,262	209,897	1,718,692	1,225,768	1,047,690
France . .	454,088	371,061	348,442	2,351,402	1,961,094	1,860,545
New S. Wales	20,371	159,622	168,531	99,629	747,876	847,022
Queensland .	786	59,475	54,188	3,725	270,231	269,077
Victoria . .	98,177	255,716	227,574	469,168	1,212,660	1,144,141
New Zealand .	249,879	294,982	300,418	1,245,022	1,394,455	1,467,628
Canada . .	185,437	268,607	292,117	866,249	1,194,823	1,428,494
United States .	42,405	68,754	84,874	190,678	294,584	401,916
Other countries	185,069	186,319	176,739	916,998	911,946	904,068
Total .	4,060,694	4,241,005	4,147,864	20,798,707	21,117,162	21,585,622
MARGARINE from—	Cwt.	Cwt.	Cwt.	£	£	£
Norway . .	5,210	5,667	6,731	12,987	14,081	16,153
Holland . .	843,016	927,980	1,051,560	2,188,461	2,390,243	2,618,293
France . .	28,795	23,580	27,324	99,751	82,305	95,259
Other countries	5,102	3,051	2,574	12,419	7,838	6,581
Total .	882,123	960,278	1,088,189	2,313,618	2,494,467	2,736,286
CHEESE from—	Cwt.	Cwt.	Cwt.	£	£	£
Holland . .	302,503	233,601	214,009	706,832	542,530	498,925
France . .	36,004	44,268	48,884	113,531	138,289	158,224
Australia .	...	350	...	...	831	...
New Zealand .	56,339	84,947	78,626	168,071	217,286	203,344
Canada . .	1,848,142	1,900,556	1,858,769	4,823,090	4,234,790	4,804,172
United States .	360,916	224,830	175,256	953,215	503,312	445,003
Other countries	90,454	65,745	67,116	289,971	206,732	230,074
Total .	2,694,358	2,554,297	2,442,660	7,054,710	5,843,770	6,339,742
EGGS from—	Great Hundreds.	Great Hundreds.	Great Hundreds.	£	£	£
Russia . .	6,802,773	7,032,906	7,622,393	1,866,421	2,042,520	2,426,029
Denmark .	3,851,557	3,602,326	3,858,135	1,648,367	1,461,459	1,634,288
Germany .	3,087,748	3,554,232	2,175,721	994,797	1,191,161	764,966
Belgium . .	2,291,262	2,517,073	2,152,953	725,680	837,120	830,598
France . .	1,601,940	1,698,614	1,565,572	670,104	710,057	660,369
Canada . .	557,080	317,722	260,140	218,571	129,631	114,557
Other countries	1,656,534	1,219,721	1,179,347	493,659	358,626	381,669
Total .	19,848,894	19,942,594	18,814,261	6,617,599	6,730,574	6,812,476

TABLE No. 12.—PRICES OF LIVE STOCK IN 1902, 1903, AND 1904, as returned under the Markets and Fairs (Weighing of Cattle) Act, 1891.

[From Journal of the Board of Agriculture.]

NUMBER OF ANIMALS REPORTED AS ENTERING THE SCHEDULED PLACES IN GREAT BRITAIN, TOGETHER WITH THE NUMBERS WEIGHED AND THE NUMBERS PRICED.

ANIMALS.	1902.	1903.	1904.
	No.	No.	No.
CATTLE :—			
Entering markets	1,302,601	1,262,301	1,177,717
Weighed	184,499	183,466	165,105
Prices returned	145,996	147,903	140,075
Prices returned with breed and quality distinguished	121,453	123,946	119,951
SHEEP :—			
Entering markets . . .	4,508,045	4,223,877	4,041,428
Weighed	42,832	36,679	35,551
Prices returned with breed and quality distinguished	34,695	30,810	24,375
SWINE :—			
Entering markets . . .	414,351	483,232	506,853
Weighed	2,722	3,034	2,603
Prices returned with quality distinguished	2,585	2,996	2.305

CALCULATED AVERAGE PRICE PER LIVE CWT. IN TWELVE SELECTED PLACES.

(Obtained by dividing the total price by the total weight of the weighed animals of all descriptions in each of the three qualities or grades.)

PLACES.	Inferior or third quality.				Good or second quality.				Prime or first quality.			
	1903.		1904.		1903.		1904.		1903.		1904.	
	Per cwt. s.	d.	Per cwt. s.	d.	Per cwt. s.	d.	Per cwt. s.	d.	Per cwt. s.	d.	Per cwt. s.	d.
ENGLAND :—												
Carlisle . . .	27	6	27	2	30	8	31	4	35	6	35	4
Leeds . . .	...		...		31	10	30	10	35	6	34	8
Liverpool . . .	26	6	24	8	30	2	29	8	34	6	34	2
London . . .	28	8	26	0	33	10	33	10	37	10	37	2
Newcastle . . .	...		...		33	4	32	8	37	6	36	8
Shrewsbury . .	30	0	28	2	33	10	33	2	36	2	34	4
SCOTLAND :—												
Aberdeen . . .	26	6	25	2	34	6	33	6	37	2	36	10
Dundee . . .	25	0	24	4	34	6	33	8	37	8	36	10
Edinburgh . .	32	0			35	4	34	8	37	8	36	2
Falkirk . . .	30	8	30	6	34	10	34	2	37	2	36	6
Glasgow	34	4	32	6	35	10	35	0	36	8	36	2
Perth	31	2	30	6	34	4	33	6	37	4	36	2

TABLE No. 13.—NUMBER AND VALUE OF LIVE CATTLE, SHEEP, AND SWINE imported into the United Kingdom in the undermentioned Years. [*From Trade and Navigation Returns.*]

	Number.			Value.		
	1903.	1904.	1905.	1903.	1904.	1905.
CATTLE, from—				£	£	£
Channel Islands . .	1,721	1,684	1,515	31,035	28,921	25,517
Canada	190,815	146,599	148,715	3,815,776	2,547,403	2,491,150
United States . .	301,757	401,249	414,906	5,899,248	7,160,062	7,149,139
Argentine Republic .	27,817	..	.	455,671	..	..
Other countries . .	436			7,397	..	..
Total . .	522,546	549,532	565,139	9,209,122	9,736,436	9 665,806
SHEEP AND LAMBS, from—						
Canada	88,291	77,835	28,240	129,045	124,799	45,580
United States . .	171,386	294,804	150,095	264,416	456,620	226,628
Argentine Republic .	82,941	..	..	134,239	..	.
Other countries . .	16,623	9,601	4,749	18,363	10,555	6,545
Total . . .	354,241	382,240	183 084	546,063	591,984	278,753
SWINE (not separately enumerated)	..	.	150	..	..	300
TOTAL VALUE OF ANIMALS LIVING	..	..	.	9,755,185	10,328,420	9,914,859

TABLE No. 14.—NUMBER OF HORSES, CATTLE, SHEEP, AND PIGS imported into Great Britain from Ireland in each of the Years 1899-1905.

	1899.	1900.	1901.	1902.	1903.	1904.	1905.
HORSES :—							
Stallions . .	122	103	194	222	265	235	202
Mares . .	19,538	16,320	11,467	11,143	12,867	12 909	14,192
Geldings . .	22,562	19,183	13,946	13,895	14,587	14,356	16,329
Total . .	42,222	35,606	25,607	25,260	27,719	27,500	30,723
CATTLE: Oxen, Bulls, and Cows :—							
Fat . . .	278,220	275,450	261,600	306,892	246,887	232,186	224,943
Store . . .	443,456	427,891	344,954	556,554	556,506	470,361	455,067
Other cattle .	6,219	7,442	6,269	10,634	6,724	6,896	6,265
Calves . .	45,099	34,736	29,725	85,161	87,528	62,920	62,916
Total . .	772,994	745,519	642,638	959,241	897,645	772,363	749,181
SHEEP :—							
Sheep. . .	452,214	478,081	484,516	599,319	444,762	372,159	350,953
Lambs . .	423,664	384,182	358,809	456,483	380,917	367,107	349,673
Total . .	875,878	862,263	843,325	1,055,802	825,679	739,266	700,626
PIGS :—							
Fat . . .	650,850	673,847	559,232	603,108	541,601	478,922	362,791
Store . . .	37,710	41,355	36,897	34,864	28,319	26,158	1,032
Total . .	688,560	715,202	596,129	637,972	569,920	505,080	363,823

EDINBURGH CORN-MARKET GRAIN TABLES for WHEAT, BARLEY, OATS, and BEANS, showing the Quantity offered for Sale, the Quantity Sold, the Highest, Lowest, and Average Prices; also the Bushel-weights of the Highest and Lowest Prices of each kind of Grain for every Market-day, likewise the Results for every Month, and the final Result for the year 1905.

WHEAT.

Date.	Quantity offered for Sale.	Quantity Sold.	Highest Price.	Lowest Price.	Average Price.	Table of Bushel-weights for			
						Highest Price.		Lowest Price.	
1905 Jan.	Imp. qr.	Imp. qr.	s. d.	s. d.	s. d.	lb.	lb.	lb.	lb.
4	266	216	31 3	28 0	30 3		63½	62¼	63
11	607	607	31 9	27 6	30 6		63		60
18	411	401	32 0	30 0	31 8		63		62
25	771	771	32 6	28 6	31 6	63	63½		59
	2,055	1,995	32 0	28 3	31 1				
Feb.									
1	627	473	32 7½	29 9	31 11		63		60¾
8	513	376	32 6	31 0	32 0		63		62
15	754	607	32 6	30 0	31 7		63½	59½	61½
22	455	398	32 3	29 3	31 6	62½	63½		61½
	2,349	1,854	32 5	30 1	31 9				
March									
1	515	420	32 3	28 6	31 4		63		59½
8	626	566	32 0	30 6	31 3		63		63
15	704	472	31 3	28 6	30 10		63		61
22	564	424	32 0	28 6	31 2	63¾	64		60½
29	274	164	32 6	30 0	30 10		64½		62
	2,683	2,046	31 11	29 11	31 1				
April									
5	438	313	31 3	30 0	31 0	63	63½		62
12	213	198	31 0	29 6	30 10		63		63
19	636	571	31 6	26 0	30 7		63		60½
26	599	509	31 3	27 0	30 7		63		63
	1,886	1,681	31 2	27 11	30 8				
May									
3	899	679	32 0	28 0	30 6		65½		61
10	1,388	1,143	31 6	28 6	30 7		64		61
17	874	734	31 6	28 6	31 0	63	64		61½
24	1,129	1,009	32 0	27 0	30 11		64		60
31	1,079	864	32 0	30 0	31 5		63		62½
	5,369	4,429	31 9	28 0	30 10				
June									
7	1,750	1,545	33 0	28 6	31 5		65		61
14	1,258	966	33 0	29 3	31 9		64½		61
21	1,647	1,207	32 6	30 0	31 8	63½	64		62
28	861	597	32 6	28 0	31 7		64		59
	5,516	4,315	32 8	29 3	31 7				
July									
5	367	356	32 6	31 3	31 6		64	63	64
12	256	221	33 0	31 0	31 10		64		63
19	380	265	32 9	27 0	32 2		63		59½
26	934	884	33 3	29 6	32 10	63	64½		61
	1,937	1,726	33 2	31 0	32 4				

WHEAT—*continued.*

Date.	Quantity offered for Sale.	Quantity Sold	Highest Price.		Lowest Price.		Average Price.		Table of Bushel-weights for Highest Price.		Table of Bushel-weights for Lowest Price.	
1905	Imp. qr.	Imp. qr	s.	d	s	d	s.	d.	lb.	lb	lb.	lb.
Aug.												
2	702	377	33	0	32	0	32	6		64		62
9	551	529	32	6	31	0	32	2	63	64		63
16	424	174	32	6	31	0	32	0		62		62½
23	385	70	31	0			31	0		63		
30	198	198	32	0	27	6	31	9		63		58½
	2,260	1,348	32	1	31	3	32	1				
Sept.												
6	85	45	28	6			28	6		61		
13	258	258	32	6	26	6	29	11		63		60¼
20	512	432	32	0	26	0	29	4		63		60¼
27	1,340	947	32	0	24	0	28	8		63		58
	2,195	1,682	31	5	25	7	29	0				
Oct.												
4	988	606	32	6	28	0	29	0		63		62
11	1,714	1,012	33	0	26	0	28	6		63		62
18	2,031	1,074	33	0	26	6	28	2	63	64		63
25	1,534	1,164	33	0	26	0	28	9		63		62
	6,267	3,856	32	10	26	7	28	7				
Nov.												
1	1,481	818	33	0	26	0	28	11		63		62
8	927	602	33	0	25	3	28	8		63		60
15	714	474	32	6	25	6	29	1		63	58½	60½
22	754	640	32	0	26	0	29	0	61½	63	59	60
29	612	587	31	6	26	6	29	3		63		61½
	4,488	3,121	32	3	25	10	29	0				
Dec.												
6	590	585	30	6	26	6	29	6		63		59
13	1,051	1,046	31	0	27	6	29	9		63		58½
20	695	664	31	0	28	6	29	7		62		60¾
27	883	753	30	6	27	6	29	6		63		62
	3,219	3,048	30	8	27	11	29	7				
Result for year	40,224	31,101	32	1	28	9	30	6				

BARLEY.

Date.	Quantity offered for Sale.	Quantity Sold	Highest Price.		Lowest Price.		Average Price.		Table of Bushel-weights for Highest Price.		Table of Bushel-weights for Lowest Price.	
1905												
Jan.												
4	1,820	1,452	29	0	22	0	25	5		56		48¾
11	1,527	1,025	31	6	18	6	26	0		56		48½
18	1,680	1,263	31	0	22	6	26	6		56		50½
25	1,554	1,200	29	9	23	0	27	0		56		56
	6,581	4,940	30	0	20	7	26	2				
Feb.												
1	1,957	1,078	29	0	22	6	27	5		56		50½
8	1,055	540	28	6	25	0	27	1		56		55
15	1,583	1,247	30	0	24	6	27	9		56	55	56
22	1,727	776	31	6	23	0	27	8		57		56
	6,322	3,641	29	5	24	3	27	6				

BARLEY—*continued.*

Date.	Quantity offered for Sale.	Quantity Sold.	Highest Price.	Lowest Price.	Average Price.	Table of Bushel-weights for Highest Price.		Table of Bushel-weights for Lowest Price.	
1905	Imp. qr.	Imp. qr.	*s.* *d.*	*s.* *d.*	*s.* *d.*	lb.	lb.	lb.	lb.
March									
1	1,734	965	30 0	25 0	27 5		57½		56
8	1,379	842	35 0	23 9	27 0		56		53
15	1,509	1,026	29 0	25 3	27 10		56		53
22	798	341	29 9	26 0	28 5		57		56
29	806	428	29 6	26 0	28 4	55½	56		54
	6,226	3,602	29 7	24 11	27 8				
April									
5	707	373	30 0	27 3	28 2		56		56
12	569	405	29 6	26 6	27 11		56		56
19	469	341	28 6	26 6	27 5		56	55	56
26	531	306	28 6	22 0	27 0		56		53
	2,276	1,425	29 1	26 3	27 8				
May									
3	409	409	29 0	26 6	27 7		56		56
10	326	40	26 9	..	26 9		56		..
17	163	69	28 0	26 3	27 9		56		54
24	174	..	..	..	..		..		..
31	95	73	28 0	..	28 0		56		..
	1,167	591	27 11	26 5	27 7				
June									
7	88	.	..	..	..		..		..
14	..	..	..	..	..		..		..
21	35	35	27 6	..	27 6		56		..
28	..	..	..	..	..		..		..
	123	35	27 6	..	27 6				
July									
5	..	..	..	..	..		..		..
12	..	..	..	..	..		..		..
19	14	14	26 6	..	26 6		55		..
26	.	..	..	..	..		..		..
	14	14	26 6	..	26 6				
Aug.									
2	..	..	..	..	..		..		..
9	..	..	..	..	..		..		..
16	708	388	29 0	24 6	27 9		56		55
23	943	733	29 0	25 3	27 7		56		56
30	586	456	29 6	26 0	27 4		56		55
	2,237	1,577	29 1	25 6	27 7				
Sept.									
6	1,413	1,253	28 3	23 0	25 8		54½	53½	55
13	2,025	1,545	29 6	22 6	26 0		56		53½
20	2,660	2,363	29 0	22 0	25 11		56		54
27	2,462	1,582	29 0	22 0	25 5		56		53
	8,560	6,743	29 0	22 5	25 10				
Oct.									
4	2,483	1,828	28 0	22 0	25 10		56		51¾
11	2,852	1,467	28 0	23 0	25 1		56		56
18	2,167	1,316	28 0	22 0	25 8	55	56		52
25	1,566	375	27 6	22 0	25 9		56		52
	9,068	4,986	27 11	22 6	25 7				

BARLEY—*continued.*

Date.	Quantity offered for Sale.	Quantity Sold.	Highest Price.	Lowest Price.	Average Price.	Table of Bushel-weights for Highest Price.	Table of Bushel-weights for Lowest Price.
1905 Nov.	Imp. qr.	Imp. qr.	*s.* *d.*	*s.* *d.*	*s.* *d.*	lb. lb.	lb. lb.
1	1,808	1,218	30 0	24 9	27 2	56	55
8	2,090	1,295	29 0	25 0	26 9	56	56
15	1,330	790	30 0	24 0	26 8	56	55
22	2,387	1,627	30 0	24 0	26 9	56	54
29	1,905	1,356	29 6	23 6	27 1	56	54
	9,520	6,286	29 7	24 4	26 10		
Dec.							
6	1,434	911	31 0	24 0	26 11	56	53½
13	1,897	969	30 0	24 6	27 7	55½ 56	51½
20	2,557	1,671	29 3	23 0	26 9	56	54
27	1,507	996	29 6	24 6	26 8	56	54 56
	7,395	4,547	29 10	24 1	26 11		
Result for year	59,489	38,387	29 0	24 3	26 8		

OATS.

1905 Jan.							
4	1,911	671	22 3	16 0	19 7	44½	42
11	3,271	1,768	21 9	15 6	19 8	44½	40½
18	2,876	1,497	22 0	15 6	19 7	44½	42
25	3,395	1,404	22 0	17 0	19 4	45	41 42½
	11,453	5,340	22 0	16 3	19 7		
Feb.							
1	2,920	1,523	21 6	16 6	19 5	42 44½	42
8	2,655	1,258	23 0	17 0	20 2	44 45½	42
15	2,819	1,390	21 6	16 3	19 10	45	41
22	3,228	1,388	23 6	15 8	19 9	44½	40
	11,622	5,558	22 6	16 4	19 9		
March							
1	3,068	1,208	23 0	17 6	20 8	44	42
8	3,951	2,048	23 6	17 0	20 5	45½	41
15	3,170	1,477	23 6	17 6	20 11	44½	42
22	2,968	1,573	24 0	17 0	20 4	44½	41½
29	2,500	1,019	23 6	16 9	20 6	45½	42
	15,657	7,325	23 5	17 3	20 6		
April							
5	1,641	1,020	22 6	17 6	20 4	44½	42 42½
12	1,226	881	23 3	18 6	21 0	44½	42
19	1,549	1,067	23 3	19 6	21 3	44½	42
26	2,357	936	23 6	20 0	22 5	45	42
	6,773	3,904	23 1	18 4	21 4		
May							
3	2,313	1,165	23 6	20 6	22 2	45½	42
10	1,891	816	23 0	20 0	22 5	44½	42
17	1,828	946	23 3	19 6	22 2	44½	42
24	1,105	493	23 0	19 6	21 6	44½	42
31	1,181	758	23 6	21 0	22 2	45½	42 44½
	8,318	4,178	23 1	20 6	22 2		

Oats—*continued.*

Date.	Quantity offered for Sale.	Quantity Sold.	Highest Price.	Lowest Price.	Average Price.	Table of Bushel-weights for Highest Price.		Table of Bushel-weights for Lowest Price.	
1905	Imp. qr.	Imp. qr.	*s.* *d.*	*s.* *d.*	*s.* *d.*	lb.	lb.	lb.	lb.
June 7	1,321	757	23 9	19 6	22 5		44½		42
14	1,719	880	23 9	19 6	22 11	44½	45½		42
21	1,202	636	24 0	21 0	22 11		44½		42
28	1,430	464	24 0	21 6	23 1	44½	45½	42	42
	5,672	2,737	23 11	20 4	22 10				
July 5	1,742	496	24 3	21 0	23 4	44½	45½		42
12	1,849	343	24 0	20 9	22 4		44½		42
19	1,718	372	23 6	20 0	22 5		44½		42
26	1,695	660	23 6	20 0	22 4		44¾		42
	7,004	1,871	24 0	20 6	22 8				
Aug. 2	1,848	285	23 0	22 0	22 3		44½	44	45
9	1,687	577	24 0	18 9	21 9		43½		44
16	2,590	1,341	22 0	18 0	20 2	43½	44		42¾
23	2,328	1,409	22 6	17 0	20 0		44		42
30	1,561	774	22 3	18 6	20 8		44½		42
	10,014	4,386	22 8	19 9	20 7				
Sept. 6	1,777	1,147	22 6	16 0	20 4		44		41
13	1,940	1,195	22 6	17 6	20 0		44½		42
20	2,712	1,309	22 6	16 6	18 9		44½		42
27	3,050	1,817	22 0	15 9	18 3		44½		39½
	9,479	5,468	22 4	16 3	19 3				
Oct. 4	1,898	1,052	21 6	16 6	18 9		44½		42½
11	1,452	1,064	21 0	17 3	18 10	44½	45		42
18	2,090	1,228	23 3	16 3	19 7		45		42
25	1,466	1,021	22 0	18 0	19 7	44	44½	42½	43
	6,906	4,365	21 9	17 4	19 3				
Nov. 1	1,459	1,124	22 0	16 6	20 3		44½		41
8	2,211	1,017	23 0	18 0	20 3		44½		42
15	2,585	1,521	22 6	17 6	20 1		44½		41
22	3,079	1,938	23 6	17 6	19 8		45		42
29	1,802	1,050	22 9	16 6	19 8		44½		40
	11,136	6,650	22 7	17 2	19 11				
Dec. 6	2,570	1,516	23 0	18 0	19 10		44½		42½
13	2,148	1,560	22 3	18 0	19 7		44½	41	42
20	2,047	1,329	22 0	18 0	19 9	42	43½		42½
27	2,000	1,262	22 6	18 6	20 0		44½		42
	8,765	5,667	22 2	18 0	19 10				
Result for year	112,794	57,449	22 10	18 10	20 4				

BEANS.

Date.	Quantity offered for Sale.	Quantity Sold.	Highest Price.	Lowest Price.	Average Price.	Table of Bushel-weights for	
						Highest Price.	Lowest Price.
1905	Imp. qr.	Imp. qr.	s. d.	s. d.	s. d.	lb. lb.	lb. lb.
Jan.							
4	..	..	..	..	..	..	..
11	5	5	24 6	..	24 6	59½	..
18	50	50	30 0	..	30 0	66½	..
25	40	20	31 6	..	31 6	65½	..
	95	75	30 0	..	30 0		
Feb.							
1	50	50	30 3	..	30 3	63	..
8	162	50	30 6	..	30 6	65½	..
15	146	112	32 0	29 0	30 6	66½	63
22	117	31	31 0	30 3	30 5	64	65
	475	243	30 6	29 6	30 5		
March							
1	50	50	31 0	..	31 0	65½	..
8	8	..	..	..	..	..	..
15	70	..	..	..	..	..	..
22	40	..	..	..	..	..	..
29	48	40	30 6	..	30 6	64¾	..
	216	90	30 9	..	30 9		
April							
5	..	..	..	..	..	..	..
12	..	..	..	..	..	..	..
19	..	..	..	..	..	..	..
26	..	..	..	..	..	..	..
	..	..	..	..	..		
May							
3	..	..	..	..	..	..	..
10	..	..	..	..	..	..	..
17	..	..	..	..	..	..	..
24	..	..	..	..	..	..	..
31	..	..	..	..	..	..	..
	..	..	..	..	..		
June							
7	..	..	..	..	..	..	..
14	..	..	..	..	..	..	..
21	..	..	..	..	..	..	..
28	..	..	..	..	..	..	..
	..	..	..	..	..		
July							
5	..	..	..	..	..	..	..
12	..	..	..	..	..	..	..
19	..	..	..	..	..	..	..
26	..	..	..	..	..	..	..
	..	..	..	..	..		
Aug.							
2	..	..	..	..	..	..	..
9	..	..	..	..	..	..	..
16	..	..	..	..	..	..	..
23	..	..	..	..	..	..	..
30	..	..	..	..	..	..	..
	..	..	..	..	..		

BEANS—*continued.*

Date.	Quantity offered for Sale.	Quantity Sold.	Highest Price.	Lowest Price.	Average Price.	Table of Bushel-weights for	
						Highest Price.	Lowest Price.
1905 Sept.	Imp. qr.	Imp. qr.	s. d.	s. d.	s. d.	lb. lb.	lb. lb.
6	..	..	..	..	..	..	..
13	..	..	..	..	..	..	..
20	..	..	..	..	..	..	..
27	..	..	..	..	..	..	..
	..	..	..	..	..		
Oct. 4	..	..	..	..	..	..	..
11	..	..	..	..	..	..	..
18	..	..	..	..	..	..	..
25	..	..	..	..	..	..	..
	..	..	..	..	..		
Nov. 1	..	..	..	..	..	..	..
8	..	..	..	..	..	..	..
15	..	..	..	..	..	..	..
22	..	..	..	..	..	..	..
29	..	..	..	..	..	..	..
	..	..	..	..	..		
Dec. 6	..	..	..	..	..	..	..
13	..	..	..	..	..	..	..
20	40	40	34 6	..	34 6	65¼	..
27	..	..	..	..	..	..	..
	40	40	34 6	..	34 6		
Result for year	326	448	31 0	29 6	30 10		

PRICES OF SHEEP SINCE 1818.

TABLE No. 1.—CHEVIOT SHEEP.

Year.	Wethers.					Ewes.					Lambs.				
	s.	d.		s.	d.	s.	d.		s.	d.	s.	d.		s.	d.
1818	28	0	to	30	0	not quoted.					8	0	to	10	0
1819	25	0	„	27	0	15	0	to	17	0	10	6	„	12	0
1820	20	0	„	25	0	16	0	„	17	0	10	0	„	11	0
1821	18	0	„	20	0	14	0	„	16	0	7	6	„	8	0
1822	12	6	„	13	0	8	0	„	8	6	4	6	„	0	0
1823	13	6	„	18	0	7	0	„	10	6	5	6	„	6	0
1824	14	0	„	19	0	7	0	„	9	0	4	6	„	6	0
1825	29	0	„	32	0	15	0	„	19	0	9	0	„	10	6
1826	17	6	„	21	6	13	0	„	15	0	7	0	„	7	6
1827	15	0	„	24	0	not quoted.					7	0	„	8	0
1828	18	0	„	27	6	12	0	to	15	0	7	0	„	8	3
1829	18	0	„	24	0	12	6	„	14	0	7	0	„	8	6
1830	15	0	„	21	0	8	0	„	11	0	6	0	„	6	9
1831	18	0	„	25	0	9	0	„	13	0	7	0	„	8	0
1832	19	0	„	24	0	11	0	„	16	0	7	0	„	9	0
1833	22	0	„	31	0	13	6	„	20	0	8	0	„	11	3
1834	22	0	„	31	0	13	6	„	21	0	9	0	„	11	6
1835	22	0	„	27	6	18	0	„	20	6	8	0	„	11	0
1836	24	0	„	31	6	16	0	„	19	0	10	0	„	14	0
1837	19	0	„	28	0	14	0	„	19	0	10	0	„	13	0
1838	28	0	„	30	6	17	0	„	22	0	12	0	„	14	0
1839	28	0	„	31	0	14	0	„	19	0	0	0	„	13	0
1840	24	0	„	33	0	15	0	„	23	0	7	0	„	11	6
1841	28	0	„	30	0	14	0	„	22	0	8	0	„	12	0
1842	22	6	„	28	0	13	0	„	17	0	7	6	„	10	0
1843	19	0	„	25	0	8	0	„	12	0	5	0	„	8	0
1844	21	0	„	29	0	10	0	„	16	0	8	0	„	10	6
1845	23	0	„	33	0	18	0	„	20	0	8	0	„	13	0
1846	24	0	„	33	6	14	6	„	21	6	10	0	„	14	6
1847	24	0	„	35	0	18	0	„	24	0	11	6	„	15	0
1848	28	0	„	34	6	18	0	„	28	0	11	6	„	15	0
1849	21	0	„	30	2	12	0	„	21	0	0	0	„	14	0
1850	20	6	„	29	6	12	0	„	20	0	8	0	„	13	0
1851	21	6	„	31	0	13	0	„	21	0	8	9	„	14	0
1852	21	0	„	32	0	15	0	„	23	0	8	0	„	14	0
1853	26	6	„	38	0	17	0	„	28	6	9	0	„	17	0
1854	25	0	„	36	0	17	0	„	26	0	9	0	„	16	6
1855	28	6	„	36	0	16	0	„	25	0	10	0	„	17	0
1856	22	0	„	35	6	15	6	„	24	0	10	0	„	15	0
1857	24	0	„	36	0	14	6	„	26	0	10	6	„	14	6
1858	24	0	„	34	6	14	0	„	24	6	10	6	„	14	0
1859	25	0	„	34	6	16	0	„	25	0	10	3	„	14	9
1860	26	0	„	38	0	17	6	„	27	6	12	6	„	17	6
1861	25	0	„	38	6	16	0	„	28	0	9	0	„	16	0
1862	27	0	„	37	6	17	6	„	28	0	10	0	„	16	0
1863	25	0	„	38	6	19	0	„	28	6	10	6	„	16	0
1864	31	0	„	41	0	21	0	„	31	6	14	0	„	18	0
1865	32	6	„	44	0	22	6	„	33	6	14	6	„	20	0
1866	37	0	„	50	0	29	0	„	42	6	15	0	„	26	0
1867	26	0	„	58	0	18	0	„	25	6	12	0	„	16	0
1868	30	0	„	32	0	15	6	„	21	0	7	6	„	13	0
1869	28	0	„	38	0	15	0	„	22	6	7	6	„	14	0
1870	35	6	„	43	0	18	0	„	28	0	10	0	„	17	0
1871	36	6	„	49	0	22	0	„	33	6	14	0	„	20	0
1872	45	0	„	56	0	32	0	„	42	0	16	0	„	22	0
1873	42	0	„	51	0	25	0	„	42	0	15	6	„	22	0
1874	38	6	„	44	6	21	0	„	36	0	12	0	„	17	0
1875	38	0	„	48	6	21	0	„	34	0	13	6	„	23	6
1876	40	0	„	52	6	28	0	„	30	0	13	6	„	25	0
1877	41	0	„	51	0	25	0	„	37	0	15	0	„	24	0
1878	35	6	„	48	0	28	6	„	35	0	14	0	„	22	0
1879	34	0	„	44	0	21	0	„	34	0	14	0	„	20	0
1880	30	0	„	48	6	20	0	„	30	0	12	6	„	20	0
1881	32	0	„	45	6	29	0	„	34	0	14	0	„	20	0
1882	40	0	„	51	0	30	0	„	40	0	14	0	„	20	6
1883	44	0	„	55	6	34	6	„	46	6	15	6	„	23	0
1884	36	0	„	47	6	29	6	„	41	6	12	6	„	20	0
1885	30	0	„	38	0	24	0	„	31	0	12	0	„	18	0

Table No. 1.—CHEVIOT SHEEP—*Continued.*

Year	Wethers.					Ewes.					Lambs.				
	s	*d.*		*s*	*d.*	*s.*	*d*		*s*	*d*	*s*	*d*		*s.*	*d.*
1886	32	0	to	40	0	21	0	to	29	0	12	6	to	19	0
1887	29	0	"	36	0	18	0	"	26	0	11	0	"	16	6
1888	30	0	"	38	0	19	0	"	27	0	12	0	"	17	6
1889	36	0	"	44	0	24	0	"	32	0	14	0	"	22	0
1890	31	0	"	40	0	22	0	"	30	0	12	6	"	20	0
1891	27	0	"	38	0	16	0	"	25	0	9	0	"	16	0
1892	22	0	"	30	6	13	0	"	22	0	5	0	"	11	0
1893	26	0	"	35	6	18	0	"	28	6	8	6	"	15	0
1894	26	0	"	37	0	20	0	"	31	0	10	6	"	18	6
1895	28	0	"	39	0	22	0	"	34	0	11	6	"	19	6
1896	24	6	"	34	0	19	0	"	30	6	9	0	"	16	6
1897	27	0	"	36	0	21	0	"	31	6	11	0	"	17	6
1898	27	0	"	37	0	22	0	"	32	6	12	0	"	18	6
1899	24	0	"	33	0	20	0	"	30	6	10	6	"	16	0
1900	26	0	"	36	0	22	0	"	32	6	12	0	"	17	0
1901	25	0	"	32	6	20	0	"	29	6	11	0	"	16	0
1902	24	0	"	31	6	18	0	"	27	0	9	6	"	14	6
1903	26	0	"	34	0	21	0	"	31	0	11	4	"	18	0
1904	28	6	"	36	6	23	0	"	32	6	13	0	"	20	0
1905	27	6	"	35	0	23	0	"	33	0	14	0	"	21	0

Table No. 2.—BLACKFACED SHEEP.

Year	Wethers.					Ewes.					Lambs.				
	s	*d.*		*s.*	*d*	*s.*	*d.*		*s*	*d.*	*s.*	*d.*		*s.*	*d.*
1819	22	0	to	24	0	12	0	to	15	0	8	0	to	9	0
1820	20	0	"	23	3	15	6	"	17	0	7	0	"	8	6
1821	18	0	"	20	0	12	0	"	13	0	6	0	"	7	0
1822	11	6	"	13	6	5	6	"	6	0	4	6	"	0	0
1823	12	0	"	16	0	5	0	"	6	6	4	0	"	5	3
1824	9	6	"	13	6	6	0	"	7	0	4	0	"	5	0
1825	22	0	"	26	0	11	0	"	13	6	6	0	"	9	0
1826	15	0	"	17	0	8	0	"	9	0	4	6	"	6	0
1827	14	0	"	18	6	7	0	"	10	0	6	0	"	7	6
1828	15	0	"	20	0	8	0	"	11	0	5	0	"	7	6
1829	14	0	"	18	0	9	0	"	10	0	6	0	"	7	0
1830	9	6	"	13	0	4	0	"	6	0	4	6	"	6	0
1831	13	0	"	17	0	5	0	"	7	6	5	0	"	6	6
1832	14	0	"	18	0	7	0	"	11	6	6	0	"	7	8
1833	16	0	"	24	0	7	6	"	12	0	6	6	"	9	0
1834	16	0	"	22	0	10	0	"	13	0	6	0	"	8	6
1835	15	0	"	18	9	10	0	"	13	0	7	0	"	8	0
1836	15	0	"	21	0	9	0	"	12	0	8	6	"	11	0
1837	13	0	"	16	0	8	0	"	12	0	8	0	"	9	6
1838	15	0	"	20	6	10	0	"	13	0	not quoted				
1839	15	0	"	22	0	10	0	"	12	0	7	0	to	8	3
1840	15	0	"	22	6	11	0	"	12	0	7	0	"	9	3
1841	16	0	"	20	0	9	0	"	11	0	6	0	"	8	0
1842	14	0	"	19	0	7	6	"	8	0	5	6	"	7	0
1843	not quoted.					4	9	"	6	6	not quoted				
1844	15	0	to	21	0	6	6	"	10	0	5	0	to	8	0
1845	14	0	"	23	0	8	0	"	12	0	6	0	"	8	0
1846	13	0	"	24	0	10	0	"	13	0	8	0	"	9	0
1847	20	6	"	25	0	10	0	"	14	0	8	6	"	9	6
1848	20	0	"	24	0	11	3	"	12	0	8	6	"	10	0
1849	not quoted.					not quoted					7	0	"	7	6
1850											7	0	"	0	0
1851	17	6	to	23	0	9	0	to	12	0	6	6	"	8	0
1852	18	6	"	22	0	9	6	"	12	0	4	6	"	7	9
1853	23	0	"	27	0	14	6	"	16	6	8	0	"	11	6
1854	20	0	"	26	0	11	0	"	16	6	8	0	"	10	6
1855	23	6	"	26	6	14	0	"	16	0	10	0	"	11	0
1856	17	0	"	24	0	10	0	"	20	0	7	6	"	10	0
1857	20	0	"	29	0	10	6	"	15	0	9	3	"	11	0
1858	20	0	"	27	6	9	9	"	18	9	8	3	"	10	6
1859	20	0	"	25	0	10	0	"	14	0	8	9	"	11	0
1860	21	0	"	27	3	11	0	"	16	0	10	0	"	13	6
1861	21	0	"	29	0	12	0	"	22	0	6	3	"	14	0
1862	16	9	"	27	0	12	0	"	18	8	6	0	"	12	0

TABLE No. 2.—BLACKFACED SHEEP—*Continued.*

Year.	Wethers.					Ewes.					Lambs.				
	s.	*d.*		*s.*	*d.*	*s*	*d.*		*s.*	*d.*	*s.*	*d.*		*s.*	*d.*
1863	20	0	to	30	6	13	0	to	16	0	8	0	to	11	6
1864	25	0	〃	30	0	15	0	〃	19	0	10	0	〃	13	6
1865	15	6	〃	32	6	15	0	〃	25	0	10	0	〃	17	0
1866	31	6	〃	40	0	20	0	〃	36	0	13	6	〃	22	6
1867	20	0	〃	30	6	14	0	〃	22	0	7	6	〃	13	6
1868	20	0	〃	26	0	10	6	〃	13	6	7	0	〃	13	0
1869	22	0	〃	28	0	11	0	〃	14	0	6	9	〃	9	0
1870	27	0	〃	32	6	13	0	〃	22	0	8	0	〃	14	6
1871	28	0	〃	37	0	13	0	〃	23	0	11	0	〃	16	3
1872	31	6	〃	45	0	18	0	〃	32	0	12	6	〃	18	0
1873	28	0	〃	39	0	16	6	〃	27	0	7	0	〃	16	0
1874	25	0	〃	35	0	13	0	〃	20	0	7	0	〃	14	0
1875	26	6	〃	37	6	15	0	〃	21	3	9	6	〃	17	6
1876	30	0	〃	40	0	19	0	〃	24	0	13	0	〃	20	6
1877	35	0	〃	38	9	18	0	〃	25	0	13	6	〃	23	0
1878	30	0	〃	36	0	17	0	〃	23	0	12	0	〃	22	0
1879	25	0	〃	35	9	16	0	〃	24	0	10	6	〃	20	0
1880	25	0	〃	38	0	16	6	〃	22	6	10	0	〃	17	0
1881	30	0	〃	39	0	15	0	〃	23	0	10	0	〃	15	0
1882	33	0	〃	46	0	20	0	〃	28	0	12	6	〃	18	6
1883	36	0	〃	50	6	24	6	〃	33	0	14	0	〃	21	6
1884	29	0	〃	43	6	19	6	〃	28	0	12	0	〃	19	6
1885	24	0	〃	34	0	13	0	〃	22	6	10	0	〃	15	0
1886	25	0	〃	34	0	12	0	〃	22	0	10	6	〃	16	0
1887	22	0	〃	30	0	11	0	〃	19	0	8	0	〃	13	0
1888	22	0	〃	32	0	13	0	〃	24	0	10	0	〃	15	0
1889	26	0	〃	40	0	18	0	〃	29	0	13	0	〃	22	0
1890	24	0	〃	37	0	14	0	〃	27	0	10	6	〃	19	0
1891	21	0	〃	37	0	10	0	〃	24	0	7	6	〃	15	0
1892	16	0	〃	28	6	6	0	〃	17	0	3	0	〃	10	0
1893	21	0	〃	37	0	12	0	〃	24	0	7	0	〃	14	6
1894	20	0	〃	37	6	14	6	〃	26	6	8	6	〃	16	0
1895	23	0	〃	41	0	16	0	〃	28	6	9	0	〃	17	0
1896	19	0	〃	35	4	18	0	〃	24	0	6	0	〃	13	6
1897	21	0	〃	36	6	15	0	〃	25	6	7	0	〃	14	6
1898	22	0	〃	37	0	16	0	〃	26	6	8	0	〃	15	0
1899	20	0	〃	38	6	18	0	〃	24	0	5	6	〃	13	0
1900	23	0	〃	36	0	16	0	〃	26	6	8	0	〃	15	6
1901	20	0	〃	35	0	14	0	〃	25	6	6	6	〃	14	6
1902	18	6	〃	34	0	12	0	〃	24	0	6	0	〃	14	0
1903	21	0	〃	36	0	15	0	〃	28	0	7	0	〃	16	6
1904	23	0	〃	38	6	18	0	〃	30	0	8	6	〃	17	6
1905	21	6	〃	37	0	19	0	〃	31	0	9	0	〃	18	6

TABLE No. 3.—PRICE OF WOOL, PER STONE OF 24 LB., SINCE 1818.

Year.	Laid Cheviot.					White Cheviot.					Laid Highland					White Highland.				
	s.	*d.*		*s.*	*d*	*s.*	*d.*		*s.*	*d.*	*s.*	*d.*		*s.*	*d.*	*s.*	*d.*		*s.*	*d.*
1818	40	0	to	42	2			..			20	0	to	22	6			..		
1819	21	0	〃	22	0			..			10	0	〃	10	3			..		
1820	20	0	〃	22	0			..			9	0	〃	10	0			..		
1821	18	0	〃	20	0			..			9	0	〃	10	0			..		
1822	12	6	〃	14	6			..			5	0	〃	6	6			..		
1823	9	0	〃	10	6			..			5	0	〃	5	9			..		
1824	13	6	〃	15	0			..			6	0	〃	6	3			..		
1825	10	6	〃	22	0			..			10	0	〃	10	6			..		
1826	11	0	〃	14	0			..			5	0	〃	5	6			..		
1827	11	0	〃	14	0			..			5	6	〃	6	9			..		
1828	8	0	〃	11	0			..			5	6	〃	6	0			..		
1829	8	6	〃	11	0			..			4	3	〃	0	0			..		
1830	9	6	〃	11	0			..			4	6	〃	5	0			..		
1831	17	0	〃	20	0			..			7	6	〃	8	6			..		
1832	14	0	〃	16	0			..			7	0	〃	7	6			..		
1833	18	0	〃	20	7			..			10	0	〃	11	0			..		
1834	21	0	〃	24	6			..			5	6	〃	7	0			..		
1835	19	0	〃	20	6			..			9	6	〃	10	8			..		
1836	21	0	〃	25	0			..			10	0	〃	14	0			..		

TABLE No. 3.—PRICE OF WOOL—*Continued.*

Year.	Laid Cheviot.	White Cheviot.	Laid Highland.	White Highland.
	s. d. s. d.	*s. d. s. d.*	*s. d. s. d.*	*s. d. s. d.*
1837	12 0 to 14 0	..	7 0 to 7 8	..
1838	19 0 〃 22 6	..	6 0 〃 10 0	..
1839	18 0 〃 20 0	..	8 0 〃 12 0	..
1840	15 0 〃 0 0	..	7 0 〃 0 0	..
1841	15 0 〃 16 9	..	6 0 〃 7 5	..
1842	12 6 〃 14 0	..	not quoted.	..
1843	9 0 〃 11 6	..	5 0 to 6 0	.
1844	15 0 〃 18 0	..	not quoted.	..
1845	14 6 〃 17 6	..	7 6 to 8 6	
1846	12 0 〃 14 6	..	8 0 〃 8 6	..
1847	12 6 〃 14 0	.	not quoted.	.
1848	9 6 〃 11 0	..	4 9 to 0 0	..
1849	12 0 〃 16 6	..	6 0 〃 6 8	..
1850	15 0 〃 17 6	..	8 0 〃 8 6	.
1851	12 0 〃 16 0	..	8 0 〃 9 3	..
1852	13 0 〃 15 0	..	8 0 〃 9 0	..
1853	19 0 〃 22 0	..	11 0 〃 12 6	..
1854	12 0 〃 15 0	..	7 6 〃 8 6	.
1855	14 6 〃 19 0	..	8 6 〃 9 0	..
1856	19 0 〃 21 6	..	11 0 〃 0 0	..
1857	19 0 〃 24 0	..	13 0 〃 14 8	..
1858	15 0 〃 17 0	..	8 9 〃 10 0	..
1859	18 6 〃 24 0	..	10 9 〃 11 6	.
1860	22 0 〃 32 0	37 0 to 38 0	10 0 〃 11 3	..
1861	19 6 〃 27 0	from 30s. upwards	not quoted.	..
1862	18 6 〃 26 0	30 0 to 37 0	11 6 to 16 0	
1863	25 6 〃 31 0	38 0 〃 42 0	15 3 〃 17 6	
1864	31 0 〃 39 0	47 0 〃 54 0	17 6 〃 20 0	..
1865	23 0 〃 30 0	44 0 〃 45 0	15 0 〃 17 0	..
1866	24 0 〃 30 0	30 0 〃 38 0	14 0 〃 16 0	.
1867	16 0 〃 21 6	not quoted.	not quoted.	..
1868	19 0 〃 26 0	28 0 to 32 0	8 6 to 9 0	..
1869	18 0 〃 26 6	not quoted.	8 6 〃 10 0	.
1870	15 0 〃 23 6	25 0 to 26 0	9 6 〃 0 0	.
1871	20 0 〃 26 6	30 0 〃 34 6	12 0 〃 15 0	..
1872	26 0 〃 37 6	40 0 〃 48 0	18 0 〃 21 0	..
1873	17 0 〃 18 0	34 0 〃 40 0	9 0 〃 12 0	.
1874	18 6 〃 26 6	30 0 〃 34 0	9 6 〃 13 0	..
1875	25 0 〃 32 0	34 6 〃 36 0	12 6 〃 16 0	..
1876	20 0 〃 24 0	30 0 〃 34 6	9 6 〃 12 0	.
1877	20 9 〃 26 0	28 0 〃 30 0	10 0 〃 12 0	..
1878	18 9 〃 25 0	27 0 〃 32 0	8 6 〃 11 6	..
1879	15 0 〃 17 0	prices very low.	7 0 〃 0 0	..
1880	20 0 〃 24 0	30 0 to 32 0	10 6 〃 11 6	14 0 to 15 0
1881	17 0 〃 21 0	27 0 〃 30 0	5 0 〃 9 6	12 0 〃 13 0
1882	14 0 〃 18 0	27 6 〃 28 0	7 6 〃 9 0	13 0 〃 14 0
1883	13 0 〃 18 0	26 0 〃 28 0	6 6 〃 8 6	11 6 〃 12 6
1884	13 0 〃 18 0	26 0 〃 28 0	6 6 〃 8 6	11 6 〃 12 6
1885	12 0 〃 17 0	22 6 〃 26 0	6 0 〃 8 0	11 6 〃 12 0
1886	13 0 〃 18 0	23 0 〃 27 6	6 6 〃 8 6	11 6 〃 12 0
1887	14 0 〃 22 0	23 0 〃 28 0	7 0 〃 9 0	11 6 〃 13 0
1888	13 0 〃 20 0	23 0 〃 28 0	7 0 〃 9 0	11 0 〃 12 6
1889	13 0 〃 18 0	24 0 〃 28 0	7 0 〃 9 0	11 0 〃 12 6
1890	13 0 〃 18 0	24 0 〃 28 0	7 0 〃 9 0	11 0 〃 12 6
1891	12 6 〃 18 0	22 0 〃 28 0	7 0 〃 9 0	11 0 〃 12 6
1892	12 0 〃 18 0	20 0 〃 28 0	7 0 〃 8 6	10 6 〃 12 0
1893	12 0 〃 17 0	20 0 〃 27 0	7 0 〃 8 0	10 0 〃 12 0
1894	12 0 〃 16 0	20 0 〃 26 0	7 0 〃 8 0	10 0 〃 12 0
1895	12 0 〃 16 0	20 0 〃 25 0	7 0 〃 8 0	10 0 〃 11 6
1896	11 0 〃 15 0	19 0 〃 24 0	7 0 〃 8 0	10 0 〃 11 6
1897	11 0 〃 14 0	18 0 〃 23 0	7 0 〃 8 0	10 6 〃 12 0
1898	10 0 〃 13 0	16 0 〃 20 0	7 0 〃 8 0	10 0 〃 11 6
1899	10 0 〃 13 0	13 0 〃 18 6	7 0 〃 8 0	8 6 〃 9 6
1900	9 9 〃 12 0	13 0 〃 18 6	6 9 〃 7 9	8 0 〃 9 6
1901	9 0 〃 10 0	11 0 〃 16 6	5 9 〃 6 6	8 0 〃 9 0
1902	9 0 〃 10 0	11 6 〃 17 0	6 0 〃 6 6	8 6 〃 9 6
1903	10 0 〃 12 0	15 0 〃 18 0	7 0 〃 8 0	11 6 〃 12 6
1904	15 0 〃 17 0	20 0 〃 21 0	9 0 〃 10 0	14 0 〃 15 0
1905	17 0 〃 20 0	24 0 〃 26 0	10 0 〃 11 0	15 0 〃 16 0

GENERAL SHOW AT GLASGOW, 1905.

In the midst of threatening weather the Show which the Society held at Glasgow on the 4th, 5th, 6th, and 7th of July 1905, passed off with a fair measure of success. There was a good deal of rain on the earlier part of the second day, and this no doubt kept away many people who might otherwise have been in the showyard. On the third day there was an excellent attendance of the public, but on the last day it was considerably below expectations. The drawings at the Show amounted to £4473, as against £4392 at the Glasgow Show of 1897. The city of Glasgow, in addition to a contribution of £250 to the local fund, gave the water supply free of charge. The local fund in aid of the Show reached the handsome total of £1606, the counties in the Show district contributing no less than £1356. The accounts of the Show leave a credit balance of about £1200.

The Show was held in the show-ground of the Glasgow Agricultural Society at Scotstoun. The area available was found to be less than could have been desired, yet on the whole the ground was fairly suitable.

The live stock department of the Show was both large and of high merit, in several sections even above the remarkably high level reached at Perth in 1904. The limited area of the ground made it necessary for the Society to curtail slightly the extent of space for implement stands, yet the display of machines and implements was extensive, and in every way most creditable. It was gratifying to learn that by the general body of exhibitors in this department an unusually large amount of business was transacted during the Show.

Statistics.

The following tables give the number of entries in the various sections:—

1. CATTLE.

Class.	SHORTHORN.	No. of Entries.
1. Aged bulls		8
2. Two-year-old bulls		10
3. One-year-old bulls		23
4. Cows of any age		4
5. Two-year-old heifers		3
6. One-year-old heifers		12
		60

ABERDEEN-ANGUS.

7. Aged bulls	11	
8. Two-year-old bulls	10	
9. One-year-old bulls	7	
10. Cows of any age	11	
11. Two-year-old heifers	7	
12. One-year-old heifers	21	
	—	67

GALLOWAY.

13. Aged bulls	7	
14. Two-year-old bulls	4	
15. One-year-old bulls	5	
16. Cows of any age	5	
17. Two-year-old heifers	8	
18. One-year-old heifers	9	
	—	38

HIGHLAND.

19. Aged bulls	11	
Extra stock	1	
20. Two-year-old bulls	9	
21. One-year-old bulls	12	
22. Cows of any age	9	
Extra stock	1	
23. Three-year-old heifers	16	
24. Two-year-old heifers	14	
	—	73

AYRSHIRE.

25. Aged bulls	7	
26. Two-year-old bulls	3	
27. One-year-old bulls	6	
28. Cows in milk, calved before 1902	16	
29. Cows in milk, calved after 1st January 1902	16	
30. Cows of any age, in calf, or heifers in calf, calved in 1902	15	
1905 Derby for three-year-old Ayrshire Queys (12).		
31. Two-year-old heifers	5	
32. One-year-old heifers	4	
	—	72
		310

2. HORSES.

DRAUGHT STALLIONS.

33. Aged stallions	15	
34. Three-year-old entire colts	22	
35. Two-year-old entire colts	27	
36. One-year-old entire colts	20	
1905 Derby—yearling colts (4).		
	—	84

DRAUGHT GELDINGS.

37. Aged geldings	7	
38. Three-year-old geldings	4	
39. Two-year-old geldings	6	
	—	17

DRAUGHT MARES AND FILLIES.

40. Mares with foal at foot	14	
41. Yeld mares, foaled before 1902	11	
42. Three-year-old yeld mares, or fillies	12	
43. Two-year-old fillies	20	
44. One-year-old fillies	27	
1905 Derby—yearling fillies (12).		
	—	84

DRAUGHT GELDINGS.

45. Draught geldings, any age, in harness		8

HUNTERS.

46. Colts, geldings, or fillies, foaled in 1904, the produce of thoroughbred stallions	12	
47. Fillies, mares, or geldings, for field, foaled in 1903—*in hand*	12	
48. Yeld mares, fillies, or geldings, for field, foaled in 1902—*in hand*	10	
49. Four-year-old hunters, to carry over 13 st. 7 lb.	3	
50. Four-year-old hunters, to carry 12 st. to 13 st. 7 lb.	10	
51. Aged hunters, to carry over 15 st.	6	
52. Aged hunters, to carry 13 st. 7 lb. to 15 st.	12	
53. Aged hunters, to carry 12 st. to 13 st. 7 lb.		
54. Hunter, brood mares, with foal at foot, or to foal this season	11	
	—	

HACKNEYS.

55. Brood mares, 15 hands and upwards, with foal at foot, or to foal this season to a registered sire	4	
56. Brood mares, under 15 hands, with foal at foot, or to foal this season to a registered sire	2	
57. Yeld mares or fillies, three years old		
58. Fillies, two years old		
59. Fillies, one year old		
60. Stallions, foaled in or before 1902, over 15 hands		
61. Stallions, foaled in or before 1902, over 14 and not over 15 hands		
62. Entire colts, two years old		
63. Entire colts, one year old		
		44

PONIES.

64. Stallions, 3 years old and upwards, over 12 and not exceeding 14 hands	4	
65. Stallion, 3 years old and upwards, 12 hands and under	1	
66. Yeld mares, fillies, or geldings, 3 years old and upwards, over 13 and not over 14 hands	4	
67. Yeld mares, fillies, or geldings, 3 years old and upwards, over 12 and not over 13 hands	6	
68. Yeld mares, fillies, or geldings, 3 years old and upwards, 12 hands and under	9	
	—	24

POLO AND RIDING PONIES.

69. Stallions, 3 years old and upwards, 13·2 and not exceeding 14·2 hands		
70. Yeld mare, filly, or gelding, 3 years old or upwards, 13·2 and not exceeding 14·2 hands		

COBS.

71. Riding cob or pony, not eligible by pedigree or type for any of the other pony classes, from 13·2 to 15 hands		4

HIGHLAND PONIES.

72. Highland pony stallions, 3 years old or upwards, not exceeding 14·2 hands, entered or accepted for entry in the Highland section of the Polo Pony Stud-Book	3	
Extra stock	1	
73. Highland pony entire colts, foaled in 1903 or 1904	3	
74. Highland pony mares, 3 years old or upwards, not exceeding 14·2 hands, yeld or with foal at foot, entered or accepted for entry in the Highland section of the Polo Pony Stud-Book	6	
	—	13

SHETLAND PONIES.

75. Shetland stallions, not exceeding 10½ hands, foaled before 1902	10	
76. Shetland entire colts, not exceeding 10½ hands, foaled in 1902 or 1903	8	
77. Shetland mares, not exceeding 10½ hands, with foal at foot	12	
78. Shetland yeld mares, not exceeding 10½ hands	9	
Extra stock	1	
79. Shetland fillies, not exceeding 10½ hands, foaled in 1902 or 1903	12	
	—	52

DRIVING COMPETITIONS.

80. Stallions, mares, fillies, or geldings, over 15·1 hands (12)	10	
81. Stallions, mares, fillies, or geldings, over 14 and not exceeding 15·1 hands (9)	7	
82. Stallions, mares, fillies, or geldings, 14 hands and under (11)	5	
83. Pair mares, fillies, or geldings, in double harness, over 15·1 hands (5)	3	
84. Pair mares, fillies, or geldings, in double harness, 15·1 hands and under (2)	2	
85. Pair mares, fillies, or geldings, driven tandem, any height (3)	1	
	—	28

VAN HORSES.

86. Mares or geldings, 3 years old and upwards, suited for heavy van purposes, shown in trade van	5	
		462

JUMPING.

1. Horses or ponies, any height	20	
2. Horses or ponies, any height—handicap	21	
3. Horses or ponies, any height—handicap	18	
	—	59

3. SHEEP.

BLACKFACED.

87. Tups above one shear	13	
88. Shearling tups	32	
89. Ewes above one shear, with lambs	10	
90. Shearling ewes or gimmers	12	
91. Ram lamb	6	
	—	73

CHEVIOT.

92. Tups above one shear	9	
93. Shearling tups	17	
94. Ewes above one shear, with lambs	8	
95. Shearling ewes or gimmers	13	
	—	47

BORDER LEICESTER.

96. Tups above one shear	7	
97. Shearling tups	38	
98. Ewes above one shear	11	
99. Shearling ewes or gimmers	26	
	—	82

HALF-BRED.

100. Tups above one shear	3	
101. Shearling tups	10	
102. Ewes above one shear	5	
103. Shearling ewes or gimmers	4	
	—	22

SHROPSHIRE.

104. Tups above one shear	4	
105. Shearling tups	9	
106. Ewes above one shear	6	
107. Shearling ewes or gimmers	8	
	—	27

OXFORD DOWNS.

108. Shearling tups	7	
109. Shearling ewes or gimmers	7	
	—	14

SUFFOLK.

110. Shearling tup. (*No entry.*)		
Extra stock	1	
111. Shearling ewes or gimmers	7	
112. Three ewe lambs	4	
	—	12

EXTRA SECTIONS.

113. Fat lambs, any breed or cross	5	
Extra stock	2	
	—	7
		284

4. SWINE.

114.	Boars, large white breed	6	
115.	Sows, large white breed	10	
116.	Pigs not above 8 months old, large white breed	9	
117.	Boar, white breed other than large	4	
118.	Sow, white breed other than large	4	
	Extra stock	1	
119.	Pigs not above 8 months old, white breed other than large	5	
120.	Boars, Berkshire breed	5	
121.	Sows, Berkshire breed	8	
122.	Pigs not above 8 months old, Berkshire breed	8	
			60

5. POULTRY.

1–88.	Poultry	534

6. DAIRY PRODUCE.

1.	Powdered butter, not less than 7 lb.	15	
2.	Fresh butter, 3 1-lb. rolls	17	
3.	Cheddar cheese, 56 lb. and upwards	22	
4.	Flat white cheese, 40 lb. and upward	3	
5.	Cheese, 14 lb. and under	22	
			79

ABSTRACT.

		No. of Entries.
1.	Cattle	310
2.	Horses	462
3.	Sheep	284
4.	Swine	60
5.	Poultry	534
6.	Dairy produce	79

The following table gives a comparative view of the display of cattle, horses, sheep, swine, poultry, dairy produce, and implements, of the value of the premiums offered, and of the receipts at the entrance-gates, grand stands, and for catalogues at the Shows which have been held at Glasgow:—

Year.	Cattle.	Horses.	Sheep.	Swine.	Poultry.	Dairy Produce.	Implements.	Premiums.	Receipts.
1826	226	49	26	24	...	...	50	£186	£275
1828	314	42	26	42	7	...	30	277	400
1838	461	121	102	45	...	39	62	731	849
1844	558	210	166	57	27	277	357	1600	1892
1850	484	164	241	73	86	316	577	1359	1909
1857	415	240	298	89	143	234	610	1500	2415
1867	286	212	257	58	150	143	1344	1600	3005
1875	411	405	296	48	479	152	2220	2665	6231
1882	376	331	232	39	254	182	2622	2878	3249
1888	300	308	293	26	209	110	1606	2464	2187
1897	317	350	245	30	275	126	2227	2897	4392
1905	310	462	284	60	534	79	1875	3702	4473

A Comparison.

The following figures, relating to some of the most successful Shows the Society has held, will be perused with interest:—

	Cattle.	Horses.	Sheep.	Swine.	Poultry.	Total Live Stock.	Implements.	Premiums.	Drawings at Show.	Profit.
Glasgow, 1867 .	286	212	257	58	150	963	1344	£1600	£3,005	£1307
Edinburgh, 1869	310	212	340	22	239	1123	1900	1600	4,078	2067
Glasgow, 1875 .	411	405	296	48	479	1639	2220	2665	6,231	3316
Edinburgh, 1877	339	342	305	30	234	1250	2292	2714	6,734	3710
Edinburgh, 1884	580	453	493	35	253	1814	2282	4343	6,548	1855
Edinburgh, 1893	380	349	294	31	360	1414	2268	2600	4,918	2323
Aberdeen, 1894 .	314	324	184	34	365	1221	2532	2440	5,121	1678
Perth, 1896 .	292	258	204	20	374	1148	1945	2205	4,788	2511
Glasgow, 1897 .	317	350	245	30	275	1217	2227	2897	4,392	2021
Edinburgh, 1899	386	518	477	46	551	1978	2585	3844	10,285	3911
Stirling, 1900 .	321	288	369	28	457	1463	2095	2915	4,305	1078
Inverness, 1901 .	360	257	204	22	499	1340	1460	2806	2,485	99
Aberdeen, 1902 .	330	253	243	42	475	1343	1988	2796	4,413	1604
Perth, 1904 .	348	315	283	35	413	1394	1972	3058	4,993	1828
Glasgow, 1905 .	310	462	284	60	534	1750	1875	3702	4,473	1203

Cattle.

In the cattle classes the good name of Scottish farm live stock was well maintained. Sixty entries made up a creditable show of Shorthorns. In a good class of aged bulls Mr Albert James Marshall, Bridgebank, Stranraer, took the lead with a very fine bull, which ultimately became the champion of the breed. This was "Roan Conqueror" 84,519 (fig. 30), a well-shaped roan of admirable quality and character, bred by Messrs W. & J. W. Peterkin, Dunglass, Conon Bridge, got by "Collynie Conqueror" 78,609, and out of "Ruby" by "Chieftain 2nd" 70,152. The special prize of £25 offered by the Shorthorn Society for the best Shorthorn female went to Mr A. A. Haley, Whitewall, Malton, for "Bright Jewel VI.," a very promising heifer, bred by Mr Waind, Anhness, York, got by "Sir George" 77,891, out of "Bright Jewel II." by "Lifeguard" 68,908.

The Aberdeen-Angus breed of cattle kept up the grand appearance they made at Perth in 1904. The classes were all fairly well filled, and throughout the merit was of the highest order. Champion honours for this breed were won by Mr James Whyte, Hayston, Glamis, for "Jim of Delvin" 20,691 (fig. 31), a remarkably handsome three-year-old bull, of true symmetry, thick in the body and level in flesh. He was bred by Mr R. D. Jameson, Delvin Lodge, Balbriggan, Ireland, got by "Evander of St Wolstan's" 16,563, out of "Fame 2nd of Delvin"

Continued on p. 373.

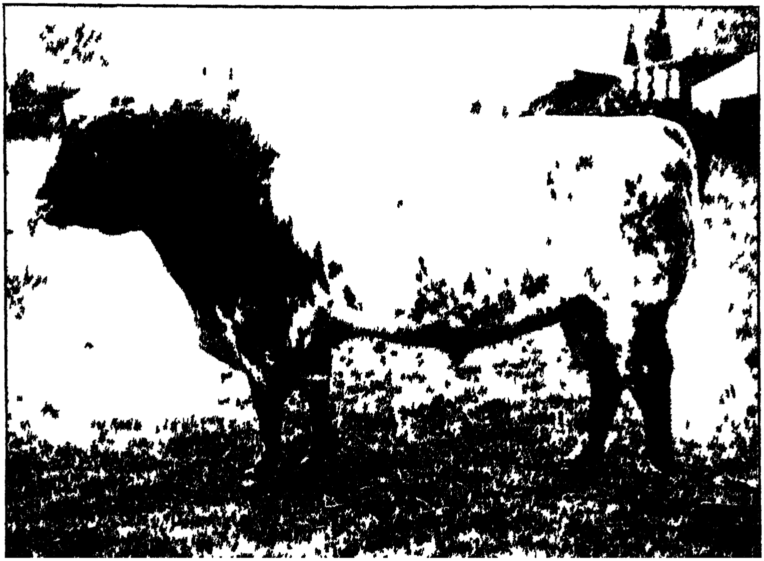

Fig 30.—Shorthorn Bull, "Roan Conqueror" 84,519

Winner of President's Medal for best Shorthorn, Glasgow Show, 1905. The property of Mr Albert James Marshall, Bridgebank, Stranraer. Bred by Messrs W. & J. W. Peterkin, Dunglass, Conon Bridge. Age three years and four months.

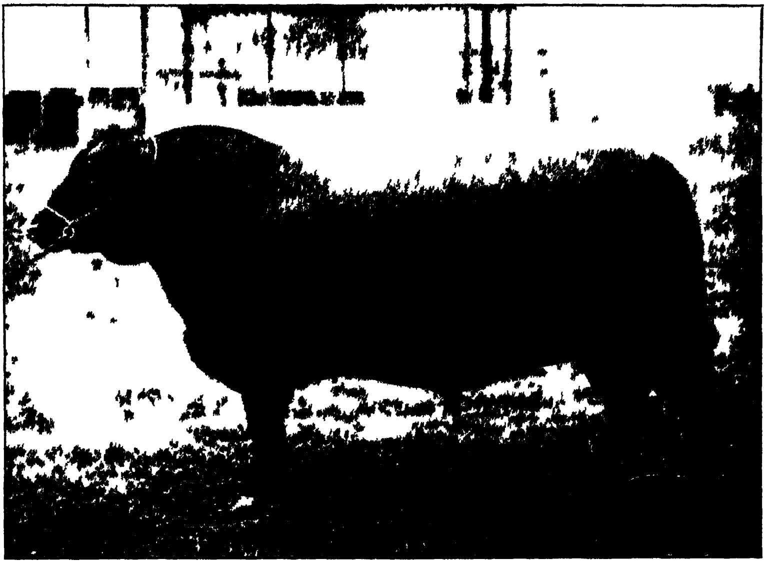

Fig 31.—Aberdeen-Angus Bull, "Jim of Delvin" 20,691.

Winner of President's Medal for best Aberdeen Angus animal, Glasgow Show, 1905. The property of Mr James Whyte, Hayston, Glamis. Bred by Mr R. D. Jameson, Delvin Lodge, Balbriggan, Ireland. Age three years and three months.

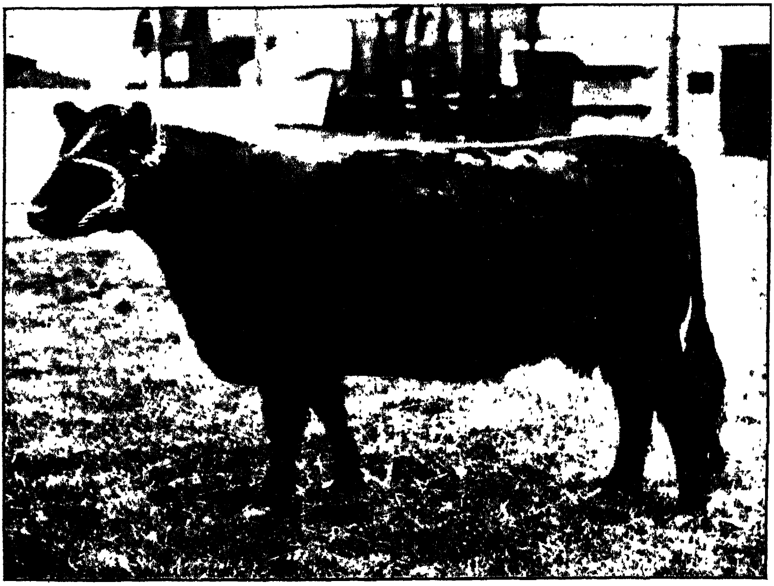

Fig. 32.—Galloway Cow, "Knockstocks Jessie" 16,116.

Winner of President's Medal for best Galloway, Glasgow Show, 1905. The property of Mr A. B. Matthews, Newton-Stewart. Bred by Messrs Wilson, Cumstone, Lockerbie. Age six years.

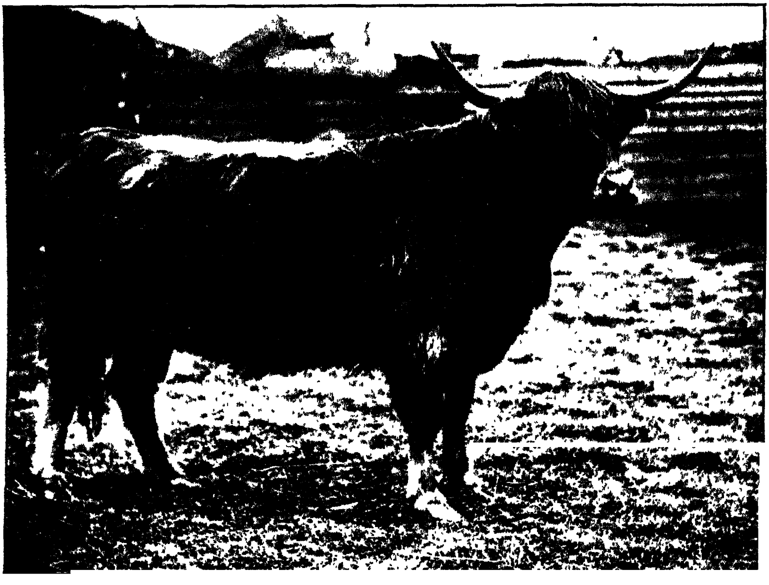

Fig. 33.—Highland Heifer, "Laochag."

Winner of President's Medal for best Highland animal, Glasgow Show, 1905. Bred by and the property of Mr D. A. Stewart, Ensay, Obbe, Portree. Age three years and five months.

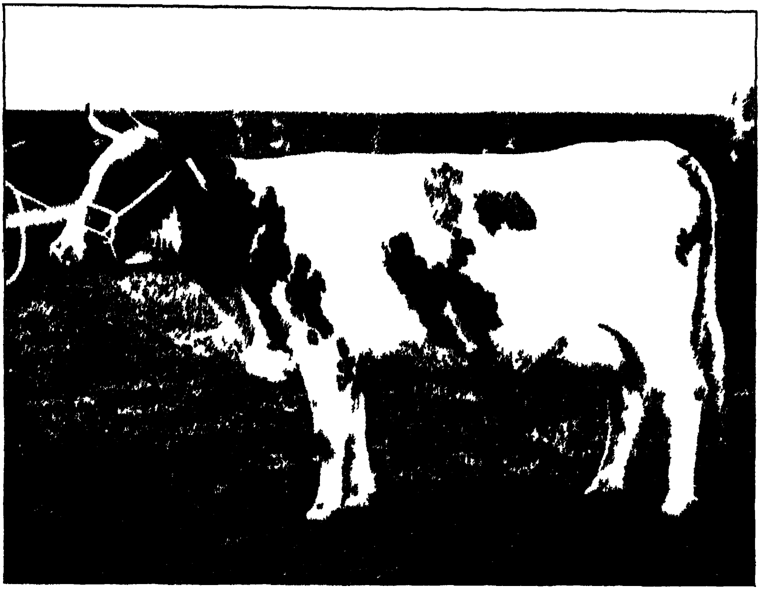

Fig. 34.—Ayrshire Cow, "Harvey 6th of Manswrae" 14,239.

Winner of President's Medal for best Ayrshire, Glasgow Show, 1905. Bred by and the property of Mr R. Wilson, Manswrae, Bridge of Weir. Age six years.

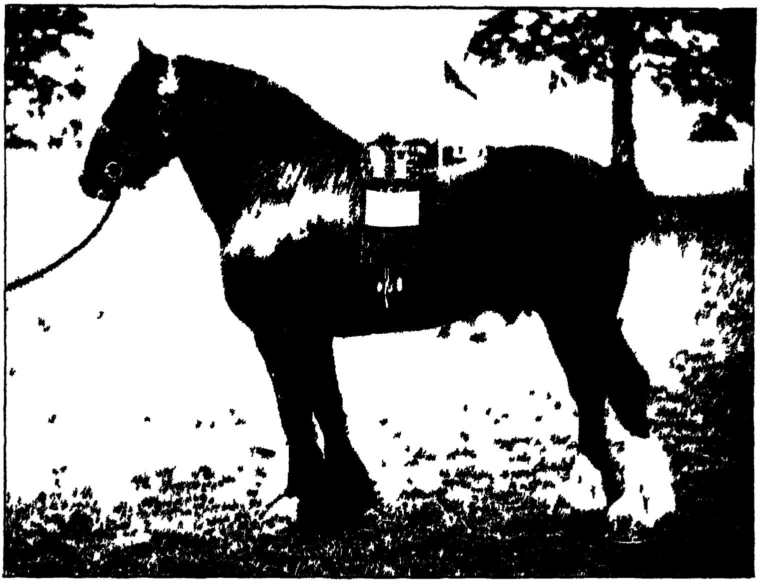

Fig. 35.—Clydesdale Stallion, "Royal Chattan" 11,489.

Winner of President's Medal for best Clydesdale Stallion or Colt, Glasgow Show, 1905. The property of Mr W. S. Park, Hatton, Bishopton. Bred by Mr John Findlay, Springhill, Baillieston. Age five years.

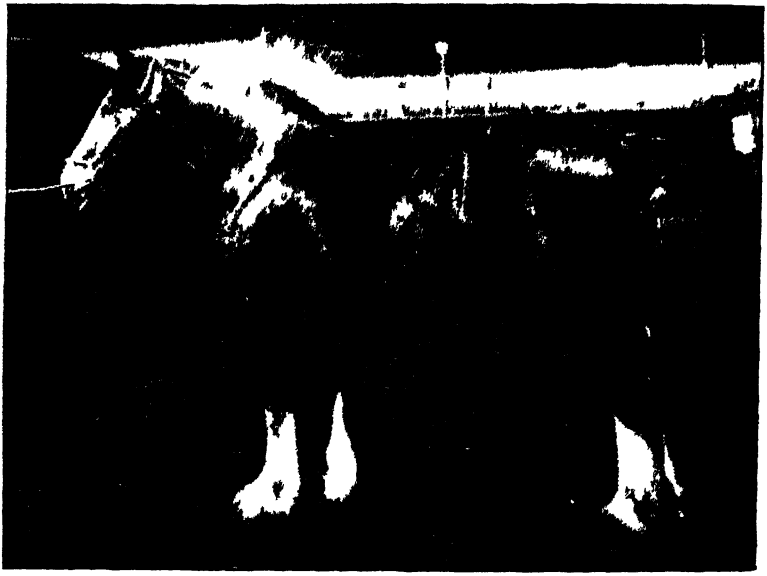

Fig 36.—DRAUGHT GELDING, "KING HARRY"

Winner of President's Medal for best Draught Gelding, Glasgow Show, 1905 The property of Mr George Hodgson, Carlatton, Carlyle Bred by Mr W Ismay, Waverton, Wigton Age five years

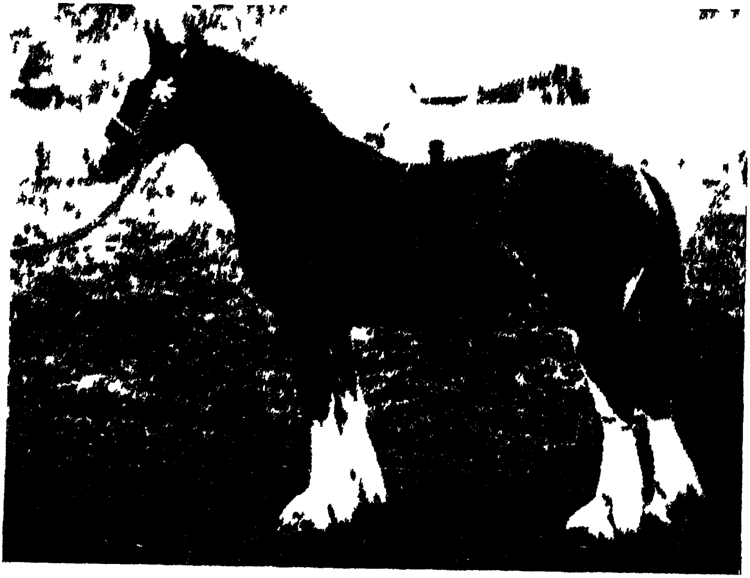

Fig 37—CLYDESDALE FILLY, "ROSADORA"

Winner of President's Medal for best Clydesdale Mare or Filly, Glasgow Show, 1905 The property of Mr W Park, Brunstane Portobello Bred by Mr W Howden, Stoneyhill, Musselburgh Age two years and two months

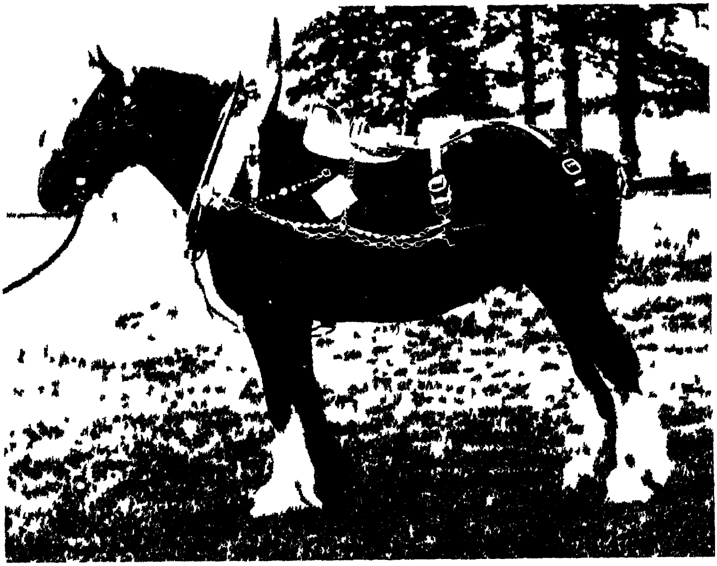

Fig. 38.—Draught Gelding, "Regent"

Winner of President's Medal for best Draught Gelding in Harness, Glasgow Show 1905. The property of the Scottish Co-operative Wholesale Society, Ltd., Glasgow. Breeder unknown. Age five years.

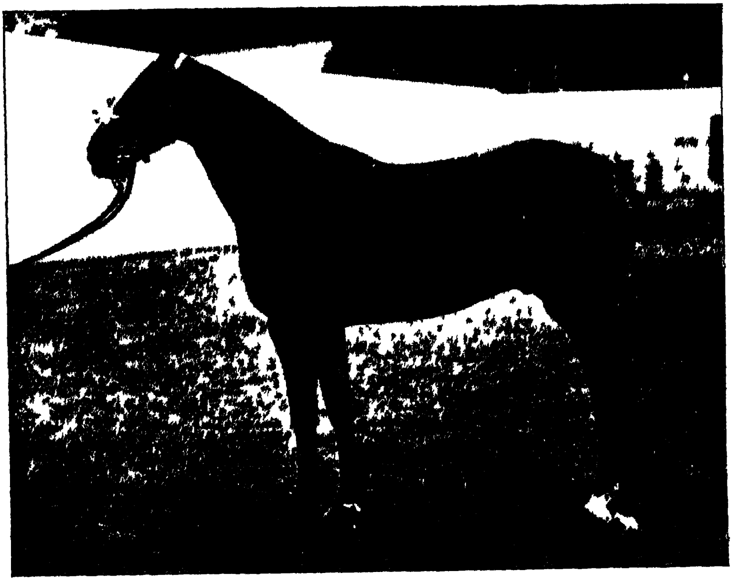

Fig. 39.—Hunter Gelding, "Baronet"

Winner of President's Medal for best Hunter, Glasgow Show 1905. The property of Mr. John Henry Stokes, Great Bowden, Market Harboro. Bred by Mr. W. Coates, Butterwick, Brawby, Yorks. Age six years.

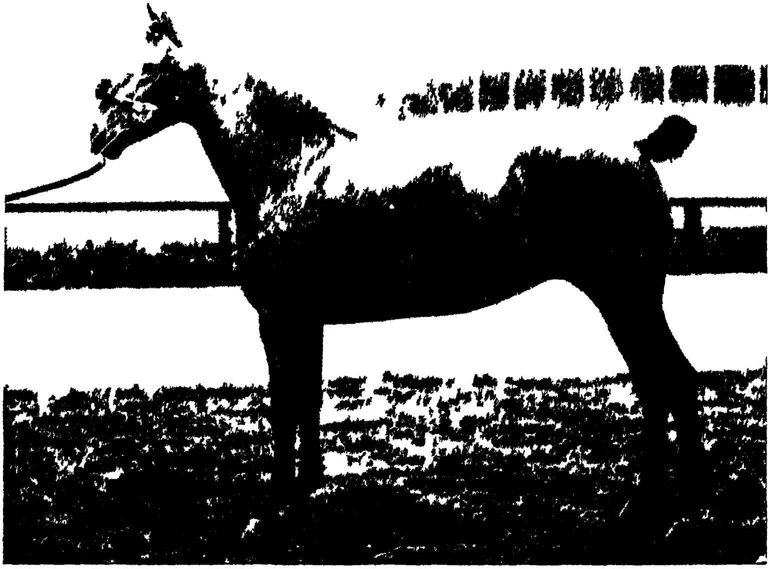

Fig. 40.—HACKNEY MARE, "CRAYKE CZARINA" 15,715

Winner of Presidents Medal for best Hackney Glasgow Show, 1905 The property of Mr Stephen Cliff Wyndham Hall, Crayke Easingwold, Yorks Bred by Mr I Hodgson, Whin Hill, Ottringham, Yorks Age three years and three months

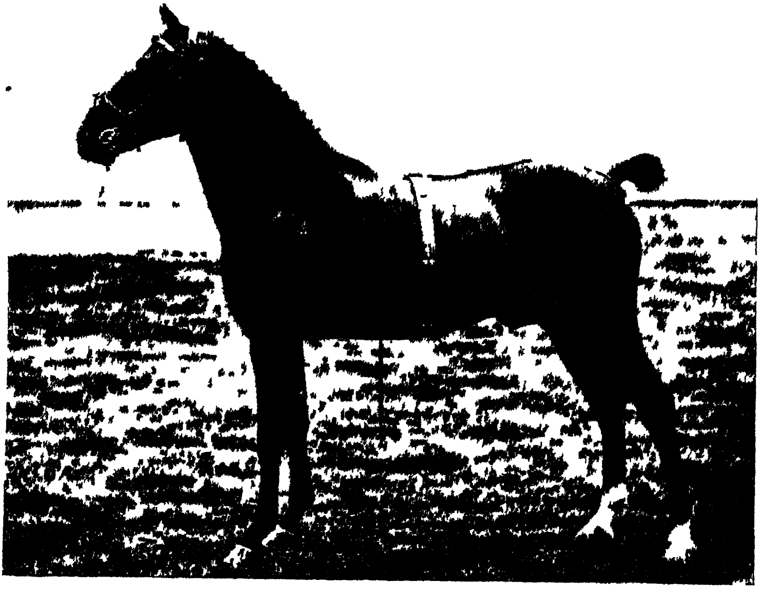

Fig. 41.—PONY STALLION, "HORACE JUNIOR"

Winner of Presidents Medal for best Pony, Glasgow Show 1905 The property of Mr W S Miller The Moorings Dumbuck, Glasgow Bred by Mr James M'Meeken, Kellybank, Dollar Age three years

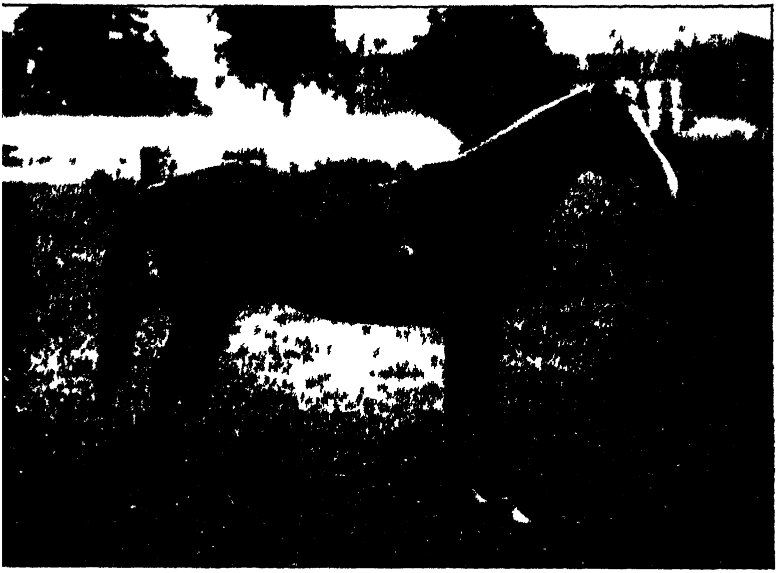

Fig. 42—ARAB PONY STALLION, "MAHMUD" 296.

Winner of President's Medal for best Polo or Riding Pony, Glasgow Show, 1905 The property of the Marquis of Tullibardine M V O , D S O , Blair Atholl Breeder unknown Age thirteen years

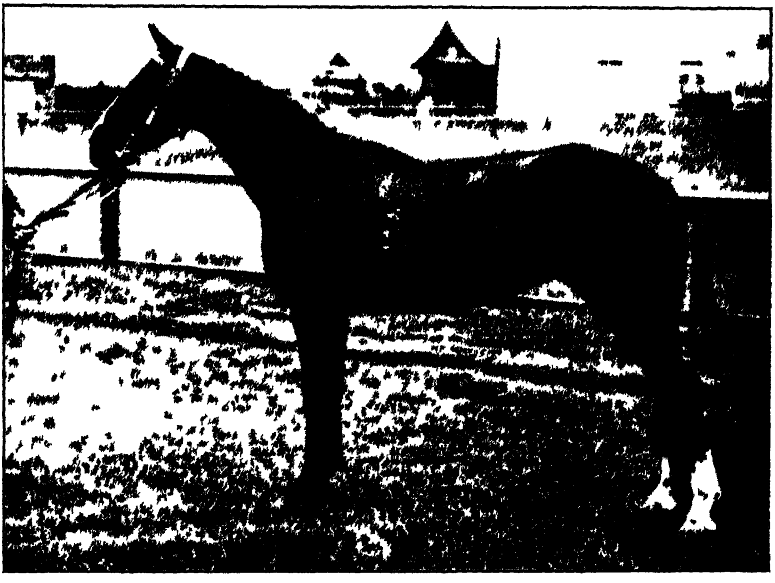

Fig 43—PONY GELDING, "BOLAND"

Winner of President's Medal for best Riding Cob or Pony in Class 71, Glasgow Show, 1905 The property of Mr Alex Cross of Knockdon Bred by Mr W M Boland, Ballina Age five years

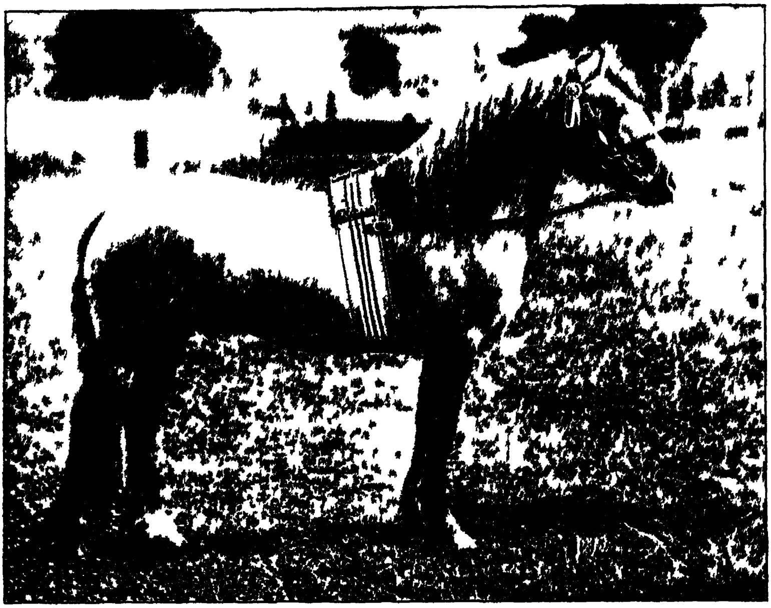

Fig 44 —Highland Pony, "Bonnie Laddie 329

Winner of President's Medal for best Highland Pony, Glasgow Show 1905 Bred by and the property of the Duke of Atholl K T Blair Castle, Blair Atholl Age four years

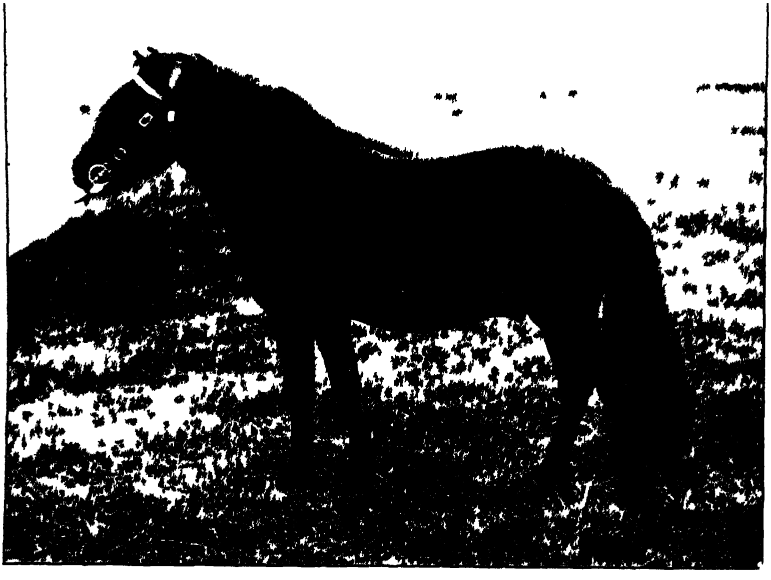

Fig 45 —Shetland Pony Stallion, "Marquis

Winner of President's Medal for best Shetland Pony Glasgow Show 1905 Bred by and the property of Mr R W R Mackenzie Earlshall Leuchars Age three years and ten months

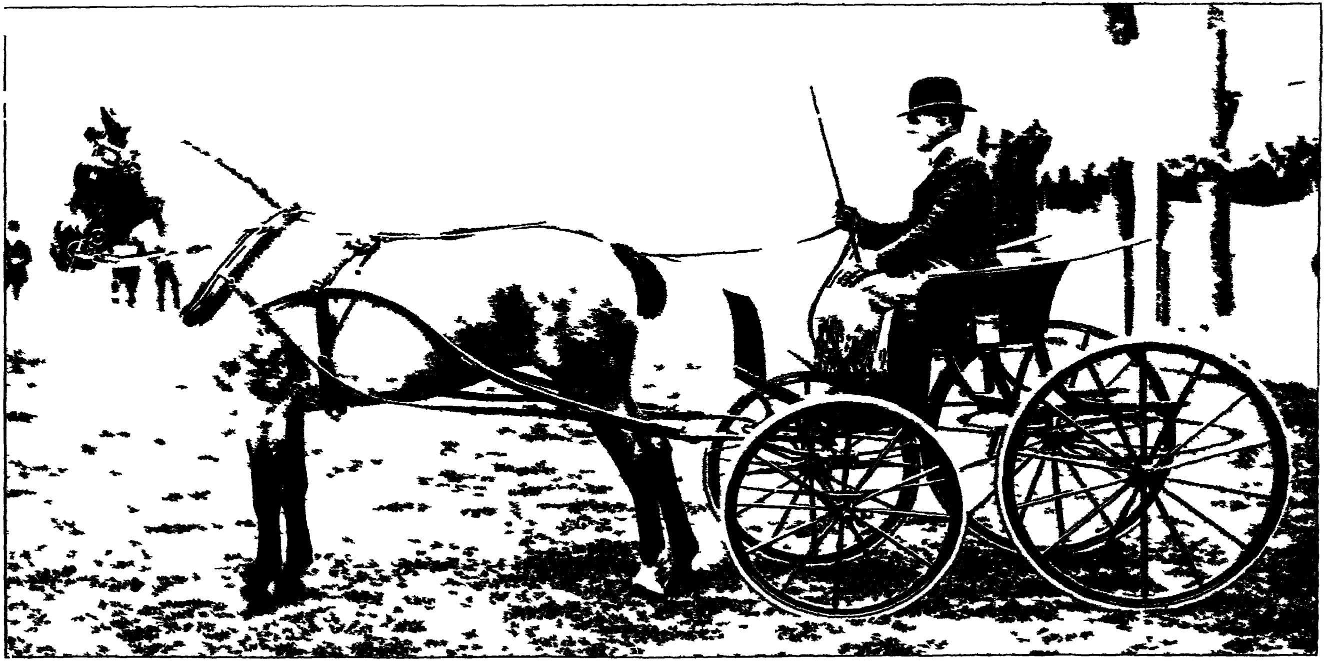

Fig 46 —'Princess,' Mare in Harness

Winner of President's Medal for best animal in the Driving Classes Glasgow Show 1905 The property of Mr A E Evans, Bronwylfa Wrexham
Bred by Mr J H Cornish, Old Walsingham, Norfolk Age nine years

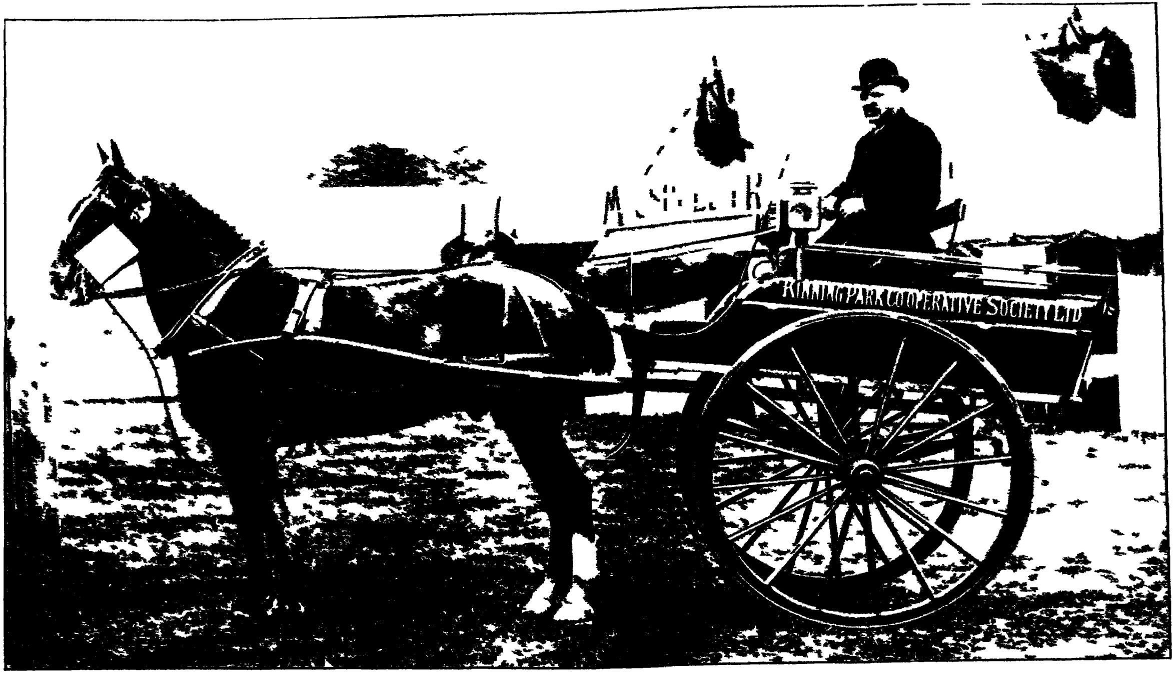

Fig 47 —Van Horse, "Climax."

Winner of President's Medal for best Van Horse Glasgow Show, 1905 The property of the Kinning Park Co operative Society, Ltd, Glasgow Breeder unknown Age six years

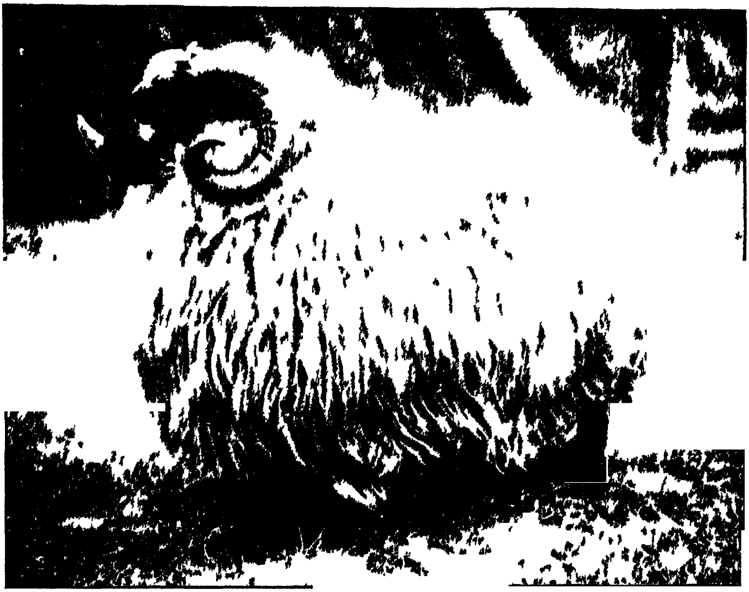

Fig 48 —Blackface Shearling Tup

Winner of President's Medal for best Blackface Sheep, Glasgow Show, 1905 Bred by and the property of Mr James Clark, Crossflat, Muirkirk

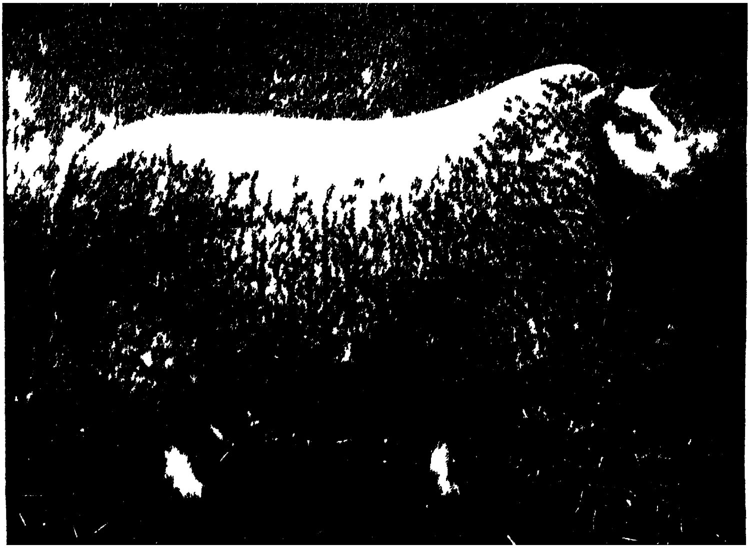

Fig 49 —Cheviot Tup

Winner of President's Medal for best Cheviot, Glasgow Show, 1905 Bred by and the property of Mr John Robson, Newton, Bellingham Age two shear

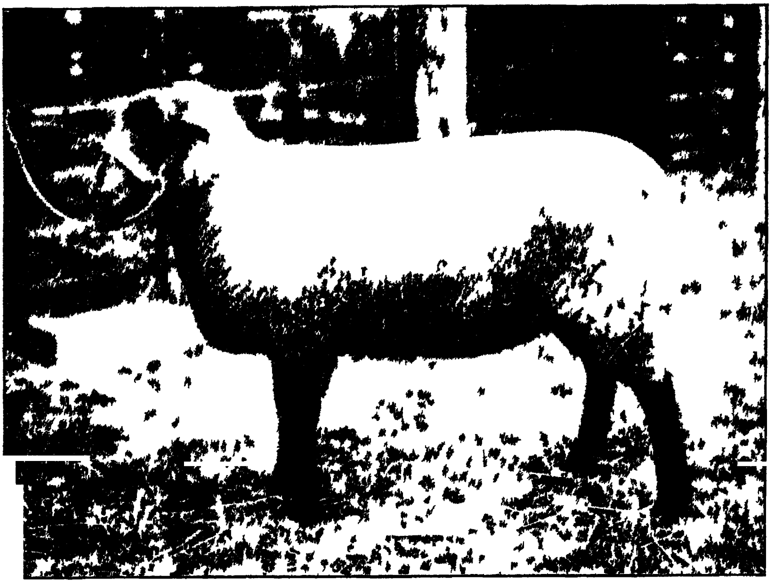

Fig 54 —Suffolk Shearling Ewe

Winner of President's Medal for best Suffolk Glasgow Show 1905 The property of Mr Alex Anderson Berryhill Dundee Bred by Lieut Col Baird Exning Newmarket

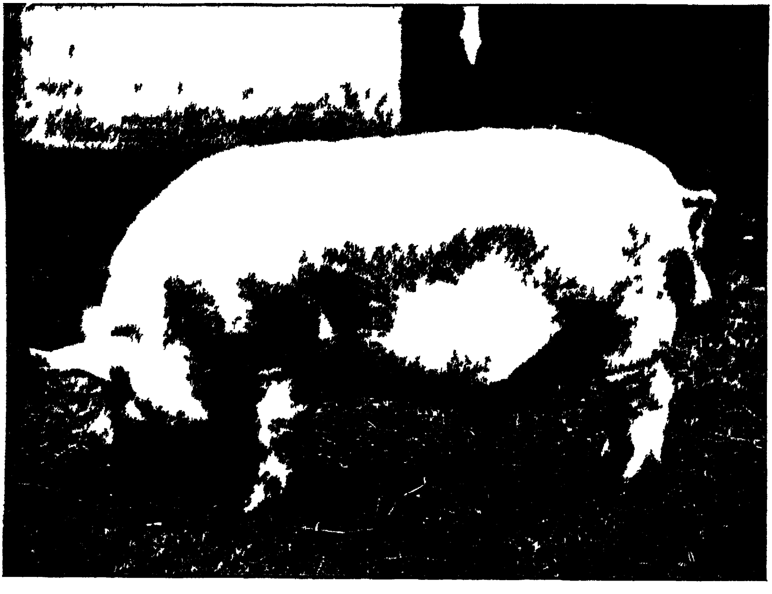

Fig 55 —Large White Boar, Broomhouse Laddie 7279

Winner of President's Medal for best animal in the Swine Classes Glasgow Show 1905 The property of Mr W B Wallace Broomhouse Corstorphine Bred by Mr R Stuart Sowerby, Garstang Lancashire Age two years and eleven months

28,670. The Ballindalloch Challenge Cup for the best Aberdeen-Angus cow went to Mr R. W. Hill, Balthayock, Perth, for his valuable cow "Bartonia of Glamis" 34,693.

Galloway cattle, although few in number, were of high general merit. The Champion Medal here went to the female side of the house, the winner being the stylish young cow "Knockstocks Jessie" 16,116 (fig. 32), with which Mr A. B. Matthews, Newton-Stewart, won first prize in the cow class. This handsome cow was bred by Messrs Wilson, Cumstone, Lockerbie, and got by "Eric of Little Whitriggs" 7233, and shows true form, desirable character and quality.

Highland cattle formed one of the strongest features of the Show. The entries were numerous, and a great proportion of the animals were of exceptional merit. In the parade ring this magnificent race of cattle made a splendid impression. Here the President's Champion Medal went to Mr D. A. Stewart, Ensay, Portree, for his grand three-year-old heifer "Laochag" (fig. 33), bred by himself, got by "Rhu na Scarbh" 1410.

As was looked for at Glasgow, Ayrshire cattle turned out in large numbers. All over the quality was high, the cow classes being particularly strong. The President's Champion Medal for the best animal of the breed was won by Mr R. Wilson, Manswrae, Bridge of Weir, for his admirably shaped cow "Harvey 6th of Manswrae" 14,239 (fig. 34). This valuable cow was bred by Mr Wilson, got by "Duke of Manswrae" 3592, and out of "Harvey 5th of Manswrae" 8955. The special prize for the best Ayrshire bull was won by Mr James Kennedy, Glenshamrock, Auchinleck, with "Safeguard of Glenshamrock" 4798, a well-formed four-year-old bull, bred by Mr R. Osborne, Morton Mains, Thornhill.

Horses.

At the Shows of the Society at Glasgow, Clydesdale horses long ago set up a very high standard. Of the display of Clydesdale horses on this occasion it is enough to say that the old standard was even more than maintained. The classes were all well filled and a splendid representation of the breed they formed.

In a very fine muster of stallions the Champion Medal went to Mr W. S. Park, Hatton, Bishopton, for his valuable five-year-old horse "Royal Chattan" 11,489 (fig. 35). This strongly set good-looking horse was bred by Mr John Findlay, Springhill, Baillieston, got by "Clan Chattan" 10,527, and out of the "Baron's Pride" mare, "Springhill Baroness" 13,792.

Draught Geldings were few in number, but several of the animals were of high merit. The President's Medal for the best

Gelding went to Mr George Hodgson, Carlatton, Carlisle, for "King Harry" (fig. 36), a well-formed five-year-old bay, bred by Mr W. Ismay, Waverton, Wigton.

At few Shows has a better turn-out of Clydesdale mares and fillies been seen than came before the judges on this occasion. Champion honours here were won by "Rosadora" (fig. 37), a very handsome two-year-old filly, shown by the late Mr W. Park, Brunstane, Portobello, bred by the late Mr W. Howden, Stoneyhill, Musselburgh, got by "Marmion" 11,429, and out of "White Stockings" 16,140 by "M'Vinnie" 9318.

The special prizes offered for draught geldings in harness brought out a small class of really good horses, the President's Champion Medal going to the Scottish Co-operative Wholesale Society, Ltd., Glasgow, for "Regent" (fig. 38), an upstanding, powerful, five-year-old black gelding of unknown breeding.

The show of Hunting horses was one of the best the Society has ever had, perhaps second only to the wonderful display of Hunters at the Edinburgh Show of 1899. The leading winner was Mr John Henry Stokes, Great Bowden, Market Harboro. To him went the President's Champion Medal for the best animal in the Hunter classes, the winning animal being "Baronet" (fig. 39), a stylish, well-shaped, six-year-old brown gelding bred by Mr W. Coates, Butterwick, Brawby.

The entries of Hackneys were on the whole disappointing, yet in almost all the classes there were animals of high value. The President's Champion Medal here went to Mr Stephen Cliff, Wyndham Hall, Crayke, Easingwold, for his handsome, strongly built three-year-old mare "Crayke Czarina" 15,715 (fig. 40), bred by Mr T. Hodgson, Whin Hill, Ottringham, Yorkshire.

The classes of Ponies were still smaller in the number of entries, but the quality was on the whole very satisfactory. Mr W. S. Miller, The Moorings, Dumbreck, Glasgow, won the President's Champion Medal for the best Pony with his attractive three-year-old bay stallion "Horace Junior" (fig. 41), bred by Mr James M'Meeken, Kellybank, Dollar, got by "Sir Horace" 5402, and out of "Lady Bounce" by "Confidence" 158.

In the Polo and Riding Pony classes only three animals were entered, the Champion Medal going to the Marquis of Tullibardine for his well-formed, speedy-looking stallion "Mahmud" 296 (fig. 42), of unknown breeding.

The class for Cobs was not so well filled as had been hoped for, only two animals being entered. Mr Alexander Cross of Knockdon got the Champion Medal here with his useful five-year-old brown mare "Boland" (fig. 43), bred by Mr W. M. Boland, Ballina.

Highland Ponies made a good appearance both as regards numbers and merit. As at Perth in 1904, the Duke of Atholl carried off the President's Medal for the best Highland Pony with the grand four-year-old stallion "Bonnie Laddie" 329 (fig. 44).

As usual, there was an excellent display of Shetland Ponies, the Champion Medal here being won by Mr R. W. R. Mackenzie, Earlshall, Leuchars, with his characteristic three-year-old stallion "Marquis" (fig. 45), bred by himself, got by "Rattler" 210, and out of "Meta" 1368 by "Thor" 83.

The excellent display in the Driving classes formed an attractive feature. The President's Champion Medal here was carried off by Mr A. E. Evans, Bronwylfa, Wrexham, with his strongly built, useful-looking, nine-year-old roan mare "Princess" 15,065 (fig. 46), bred by Mr J. H. Cornish, Old Walsingham, Norfolk, got by "Lord Derby 3rd" 1568.

Five animals of a useful stamp entered for the Special Prizes for Van Horses yoked in a trade van. The Champion Medal here went to Kinning Park Co-operative Society, Limited, for 'Climax" (fig. 47), a good-looking six-year-old bay gelding, of unknown breeding.

Sheep, Swine, &c.

The show of Sheep was of a high order throughout, the Scotch breeds being all most creditably represented. The winners of the President's Champion Medals are represented in figs. 48, 49, 50, 51, 52, 53, and 54.

The show of Swine was unusually good. The Champion Medal here was won by Mr W. B. Wallace, Broomhouse, Corstorphine, with "Broomhouse Laddie" 7279 (fig. 55), a valuable Large White boar bred by Mr R. Stuart, Sowerby, Garstang, Lancashire.

In the classes for Dairy Produce and Poultry there was an exceptionally large and good display.

NOTE.—*The Report on the Trials of Suction Gas-Producer Plants, held in the Glasgow Show, will be found at* p. 208.

TRIAL OF SWATHE TURNERS.

This trial was held at Newton Farm, Glasgow, on Monday, 3rd July, on ground kindly granted by Mr John Speir. The report of the Committee is as follows:—

There were *seven* machines entered for competition, but two of these were withdrawn. Of the remaining five, three were of the same type and manufacture—the first, right hand working; second, left hand; and the third convertible into a triplicate machine. All these were entered by Messrs P. & R. Fleming & Co., Glasgow, for Martin's Cultivator Co., Limited. Of the other two, one was exhibited by Messrs Ransomes, Sims, & Jefferies, Ipswich, and the other by Messrs Wallace, Glasgow, for Blackstone & Co., Limited, Stamford.

The first machine put on trial was Jarmain's patent (Ransomes, Sims, & Jefferies). It turned the swathe very neatly and well, but owing to the spade-like form of the turning arms, —and these having to bear closely on the ground,—there might be a liability to scraping up dirt and stones.

The next put on trial was a Martin's turner, which also performed well in turning the swathe, and is specially noted for the sweetness of its working. The attachment for the triplex arrangement was then tried, but owing to the length of the hay the rear travelling wheel seemed, by running on the swathe, to prevent efficient turning. This might be easily remedied by lengthening the main axle.

The last trial was Blackstone's machine. This machine did not turn over the swathe so well as a whole, its action being a combination of tedding and turning. It had the advantage of being easily adjusted to work right hand or left hand at will, or both simultaneously. This facility is of special importance when roadways are to be left for carts or for the machine itself. It is evident that, in the event of the hay for any reason being cut only one way, it is of advantage to have the hay turned always from the butt-end of the swathe; and this can be obtained only by such a machine as this, which works either way at pleasure.

On the whole these machines did the work required in a most satisfactory manner, and the Committee in charge of the trial feel that the machines form a valuable addition to the appliances in use for haymaking.

Jonathan Middleton, *Convener*.
W. S. Ferguson.
R. Shirra Gibb.
John Speir.

PREMIUMS AWARDED BY THE SOCIETY IN 1905.

I.—GLASGOW SHOW

4th, 5th, 6th, and 7th July 1905.

ABBREVIATIONS.—V., *Very Highly Commended.* H., *Highly Commended.* C., *Commended.*

CATTLE

SHORTHORN.

PRESIDENT'S CHAMPION MEDAL for best Shorthorn.

Albert Jas. Marshall, Bridgebank, Stranraer, N.B., "Roan Conqueror" (84,519).

Tweeddale Gold Medal for best Shorthorn Bull.

Albert Jas. Marshall, Bridgebank, Stranraer, N.B., "Roan Conqueror" (84,519).

Best Shorthorn Bull in the Show—£25, given by the Shorthorn Society.

Albert Jas. Marshall, Bridgebank, Stranraer, N.B., "Roan Conqueror" (84,519).

Breeder of best Bull of any age in Classes 1, 2, *and* 3—The Silver Medal.

Messrs Wm. & J. W. Peterkin, Dunglass, Conon Bridge, N.B.

CLASS 1. BULL, calved before 1903.—Premiums, £15, £10, £5, and £3.

1. Albert Jas. Marshall, Bridgebank, Stranraer, N.B., "Roan Conqueror" (84,519).
2. Captain C. Home Graham-Stirling of Strowan, Crieff, "Strowan Champion" (82,417).
3. Albert Jas. Marshall, Bridgebank, Stranraer, N.B., "Primrose Knight" (84,357).
4. Laurence Johnston of Sands, Kincardine-on-Forth, "Meridian" (84,115).
V. William T. Malcolm, Dunmore, by Larbert, "Ben Nevis" (82,858).

CLASS 2. BULL, calved in 1903.—Premiums, £15, £10, £5, and £3.

1. R. P. Cooper, Shenstone Court, Lichfield, "Meteor" (86,631).
2. Lady Cathcart, Cluny Castle, Aberdeen, "Edgar of Cluny" (85,853).
3. George Harrison, Gainford Hall, Darlington, "Pioneer" (86,822).
4. Alex. T. Gordon, Combscauseway, Insch, N.B., "Keir Jester" (86,287).
V. Duncan Stewart, Millhills, Crieff, "Royal Eclipse" (87,179).
H. James M'William, Stoneytown, Keith, "Gold Bank" (86,063).
C. Sir John Gilmour of Lundin and Montrave, Bart., Leven, "Broadhooks Conqueror" (85,451).

CLASS 3. BULL, calved in 1904.—Premiums, £12, £8, £4, and £2.

1. J. Deane Willis, Bapton Manor, Codford, Wilts, "Orphan's Chief."
2. Alex. T. Gordon, Combscauseway, Insch, N.B., "Fascinator."
3. George Harrison, Gainford Hall, Darlington, "Royal Ensign."
4. T. J. Sowerby, Long Meg, Langwathby, R.S.O., Carlisle, "Merry Prince II."
V. Lord Polwarth, Mertoun House, St Boswells, "British Renown."
H. George Rodger, Bridgelands, Selkirk, "Montrave Warlock."
C. J. Douglas Fletcher of Rosehaugh, Avoch, "Guardian."
C. J. Douglas Fletcher of Rosehaugh, Avoch, "Rose Chief."
C. Lumsden & Mackenzie, Huntingtowerfield, Perth, "Lord Dunglass."
C. William T. Malcolm, Dunmore, by Larbert, "Lavender Fancy."
C. Albert Jas. Marshall, Bridgebank, Stranraer, "Kelman."

Best Shorthorn Female in the Show—£25, given by the Shorthorn Society.

Alfred A. Haley, Whitewall, Malton, "Bright Jewel VI."

CLASS 4. COW, of any age, in Milk.—Premiums, £12, £8, £4, and £2.

1. J. Deane Willis, Bapton Manor, Codford, Wilts, "White Heather."
2. Sir John Gilmour of Lundin and Montrave, Bart., Leven, "Annie Wenlock."

CLASS 5. HEIFER, calved in 1903.—Premiums, £10, £5, £3, and £2.

1. James M'William, Stoneytown, Keith, "Hilda 2nd."
2. C. M. Cameron, Balnakyle, Munlochy, Ross-shire, "Butterfly 39th."
3. William T. Malcolm, Dunmore, by Larbert, "Lady Kathleen."

CLASS 6. HEIFER, calved in 1904.—Premiums, £10, £5, £3, and £2.

1. Alfred A. Haley, Whitewall, Malton, "Bright Jewel VI."
2. T. J. Sowerby, Long Meg, Langwathby, R.S.O., Carlisle, "Eastthorpe Gem."
3. Lord Lovat, Beaufort, Beauly, N.B., "Lady Teazle."
4. C. M. Cameron, Balnakyle, Munlochy, Ross-shire, "Marchioness 24th."
V. David Hume, Barrelwell, Brechin, "Veronique."
H. Lord Lovat, Beaufort, Beauly, N.B., "Broadhooks Pride."
C. James M'William, Stoneytown, Keith, "Golden Thorn."

ABERDEEN-ANGUS.

PRESIDENT'S CHAMPION MEDAL for best Aberdeen-Angus Animal.

James Whyte, Hayston, Glamis, "Jim of Delvin" (20,691).

Best Bull of any age in Classes 7, 8, *and* 9—Ballindalloch Challenge Cup, value £50, given by Sir George Macpherson Grant, Bart.

James Whyte, Hayston, Glamis, "Jim of Delvin" (20,691).

Breeder of the Winner of the Ballindalloch Challenge Cup—Silver Medal.

Robert D. Jameson, Delvin Lodge, Balbriggan, Ireland.

Breeder of best Bull of any age in Classes 7, 8, *and* 9—The Silver Medal.

Robert D. Jameson, Delvin Lodge, Balbriggan, Ireland.

Best Breeding Animal of the Breed in the Showyard—Champion Gold Medal, given by the Polled Cattle Society.

James Whyte, Hayston, Glamis, "Jim of Delvin" (20,691).

CLASS 7. BULL, calved before 1st December 1902.—Premiums, £15, £10, £5, and £3.

1. James Whyte, Hayston, Glamis, "Jim of Delvin" (20,691).
2. John Macpherson, Mulben, Keith, "Khartoum of Ballindalloch" (20,732).
3. George Cran, Morlich, Glenkindie, Aberdeen, "Jeshurun" (19,257).
4. W. S. Ferguson, Pictstonhill, Perth, "Ballo" (18,755).
H. William Wilson, Coynachie, Gartly, N.B., "Margrave of Ballindalloch" (19,445).
C. James Kennedy, Doonholm, Ayr, "Evarra" (20,507).

CLASS 8. BULL, calved on or after 1st December 1902.—Premiums, £15, £10, £5, and £3.

1. Alexander M'Laren, Auchnaguie, Tullymet, Ballinluig, "Erello" (21,861).
2. J. Ernest Kerr, Harviestoun Castle, Dollar, "Parsee of Harviestoun" (22,401).
3. Charles Calder, Woodhill, Ponteland, Ponteland, "Perfection of Sands" (22,420).
4. Arch. Whyte, Inverquharity, Kirriemuir, "Donford" (21,744).
V. John William Earle, Kirkbridge, Aldboro', Darlington, "Perseus of Cortachy" (22,426).
C. T. H. Bainbridge, Eshott Hall, Felton, Northumberland, "Idelamere" (22,036).

CLASS 9. BULL, calved on or after 1st December 1903.—Premiums, £12, £8, £4, and £2.

1. Sir George Macpherson Grant, Bart., The Castle, Ballindalloch, "England" (23,124).
2. James Calder of Ardargie, Forgandenny, "Elchi" (23,093).
3. James Kennedy, Doonholm, Ayr, "Evasor" (23,196).
4. George R. Sharp, Bardrill, Blackford, Perthshire, "Harvest King."

Best Cow of any age in Class 10—Ballindalloch Challenge Cup, value £50, given by the late Mr C. Macpherson Grant of Drumduan.

Robert Wylie Hill, Balthayock, Perth, "Bartonia of Glamis" (34,693).

Breeder of the Winner of the Ballindalloch Challenge Cup—Silver Medal.

The late Earl of Strathmore.

CLASS 10. COW, of any age, in Milk.—Premiums, £12, £8, £4, and £2.

1. Robert Wylie Hill, Balthayock, Perth, "Bartonia of Glamis" (34,693).
2. John R. Findlay of Aberlour, Aberlour Home Farm, Aberlour, "Pride of Honour" (33,608).
3. George Willsher, Pitpointie, Auchterhouse, Dundee, "Merry Nell of Pitpointie" (29,454).
4. William Wilson, Coynachie, Gartly, N.B., "Fabiana" (33,580).
V. Charles E. Hunter, Selaby, Gainford, Darlington, "Estimation" (33,962).
C. James Kennedy, Doonholm, Ayr, "Myrica" (32,175).

CLASS 11. HEIFER, calved on or after 1st December 1902.—Premiums, £10, £5, £3, and £2.

1. J. Ernest Kerr, Harviestoun Castle, Dollar, "Juana Erica" (36,285).
2. Charles E. Hunter, Selaby, Gainford, Darlington, "Ruritania" (35,794).
3. His Majesty the King, Abergeldie Mains, Crathie, Ballater, "Princess Irene 9th" (34,959).
4. John R. Findlay of Aberlour, Aberlour Home Farm, Aberlour, "Maidment of Aberlour" (37,288).
V. W. S. Ferguson, Pictstonhill, Perth, "Moss Rose of Kinochtry" (35,466).
C. George Willsher, Pitpointie, Auchterhouse, Dundee, "Titania of Pitpointie" (36,618).

CLASS 12. HEIFER, calved on or after 1st December 1903.—
Premiums, £10, £5, £3, and £2.

1. His Majesty the King, Abergeldie Mains, Crathie, Ballater, "Gwytch" (36,695).
2. J. Ernest Kerr, Harviestoun Castle, Dollar, "Princess Kobe" (37,640).
3. W. S. Ferguson, Pictstonhill, Perth, "Pride Marion" (37,270).
4. James Whyte, Hayston, Glamis, "Beauty 15th of Hayston" (38,324).
V. Charles E. Hunter, Selaby, Gainford, Darlington, "Eyelid" (37,548).
H. Robert Wylie Hill, Balthayock, Perth, "Eldorado 2nd of Dalvey" (37,402).
C. Sir George Macpherson Grant, Bart., The Castle, Ballindalloch, "Wild Bergamot" (37,431).

GALLOWAY.

PRESIDENT'S CHAMPION MEDAL for best Galloway.

A. B. Matthews, Newton-Stewart, N.B., "Knockstocks Jessie" (16,116).

Breeder of best Bull of any age in Classes 13, 14, *and* 15—The Silver Medal.

Robert Graham, Auchengassel, Twynholm, N.B.

CLASS 13. BULL, calved before 1st December 1902.—
Premiums, £15, £10, £5, and £3.

1. A. H. Fox-Brockbank, The Croft, Kirksanton, Silecroft, Cumberland, "Defiance" (8266).
2. John M'Cormick, Lochenkit, Corsock, Dalbeattie, "Othello of Kilquhanity" (8469).
3. James Wilson, Tundergarth Mains, Lockerbie, "War Cry" (8236).
4. Walter Montgomerie Neilson of Queenshill, Ringford, "Campfollower III. of Stepford" (8407).
V. Sir Robert W. Buchanan-Jardine of Castlemilk, Bart., Lockerbie, "Black Douglas IV. of Castlemilk" (8056).
H. Robert Graham, Auchengassel, Twynholm, "Defiance" (8121).

CLASS 14. BULL, calved on or after 1st December 1902.—
Premiums, £15, £10, £5, and £3.

1. Cecil Randolph Dudgeon, Cargen, Dumfries, "Chief III." (8892).
2. Thomas Graham, Marchfield, Dumfries, "Marchfield Stanley" (9321).
3. Major Wedderburn Maxwell, Glenlair, Dalbeattie, "Campfollower of Glenlair" (8887).
4. Robert Graham, Auchengassel, Twynholm, "Fiscal Policy of Auchengassel" (9068).

CLASS 15. BULL, calved on or after 1st December 1903.—
Premiums, £12, £8, £4, and £2.

1. Robert Graham, Auchengassel, Twynholm, "Black Pearl" (9190).
2. Major Wedderburn Maxwell, Glenlair, Dalbeattie, "Orion" (9188).
3. John Blackley, Marchhill, Dumfries, "Cunningham of Stepford" (9168).
4. Thomas Graham, Marchfield, Dumfries, "Invader" (9148).

CLASS 16. COW, of any age, in Milk.—Premiums, £12, £8, £4, and £2.

1. A. B. Matthews, Newton-Stewart, N.B., "Knockstocks Jessie" (16,116).
2. Sir Robert W. Buchanan-Jardine of Castlemilk, Bart., Lockerbie, "Alice II. of Castlemilk" (16,352).
3. Sir Robert W. Buchanan-Jardine of Castlemilk, Bart., Lockerbie, "Luxury of Castlemilk" (16,876).
4. Thomas Graham, Marchfield, Dumfries, "Lady Grace III." (17,485).

CLASS 17. HEIFER, calved on or after 1st December 1902.—
Premiums, £10, £5, £3, and £2.

1. Sir Robert W. Buchanan-Jardine of Castlemilk, Bart., Lockerbie, "Lady Alice of Castlemilk" (17,903).
2. Thomas Biggar & Sons, Chapelton, Dalbeattie, "Baroness of Chapelton" (17,925).
3. James Wilson, Tundergarth Mains, Lockerbie, "Harriet 7th of Tundergarth Mains" (18,124).

4. Thomas Graham, Marchfield, Dumfries, "Charlotte III. of Kilquhanity" (17,969).
V. Major Wedderburn Maxwell, Glenlair, Dalbeattie, "Eileen II. of Glenlair" (17,973).
H. James Wilson, Tundergarth Mains, Lockerbie, "Harriet 8th of Tundergarth Mains" (18,125).

Class 18. HEIFER, calved on or after 1st December 1903.—Premiums, £10, £5, £3, and £2.

1. David Brown, Stepford, by Auldgirth, Dumfries, "Evelyn of Stepford" (18,527).
2. Thomas Biggar & Sons, Chapelton, Dalbeattie, "Bonnie Jean 6th of Chapelton" (18,417).
3. Sir Robert W. Buchanan-Jardine of Castlemilk, Bart., Lockerbie, "Countess 3rd of Castlemilk" (18,384).
4. Robert Graham, Auchengassel, Twynholm, "Gipsy Queen of Auchengassel" (18,467).
V. Thomas Biggar & Sons, Chapelton, Dalbeattie, "Belinda 5th of Hensol" (18,396).
H. David Brown, Stepford, by Auldgirth, Dumfries, "Lady Wilson of Stepford" (18,528).
C. Sir Robert W. Buchanan-Jardine of Castlemilk, Bart., Lockerbie, "Alice IV. of Castlemilk" (18,386).

HIGHLAND.

PRESIDENT'S CHAMPION MEDAL for best Highland Animal.

D. A. Stewart, Ensay, Obbe, Portree, "Laochag."

Breeder of best Bull of any age in Classes 19, 20, *and* 21—The Silver Medal.

The late Earl of Southesk, Kinnaird Castle, Brechin, "Lord Clyde."

Class 19. BULL, calved before 1903.—Premiums, £15, £10, £5, and £3.

1. The Duke of Atholl, K.T., Blair Castle, Blair-Atholl, "Fear-a-Bhata of Atholl" (1819).
2. D. A. Stewart, Ensay, Obbe, Portree, "Morair-nan-Eilean."
3. W. D. Mackenzie of Farr and Newbie, Daviot, Inverness, "Calum Ban of Farr" (1783).
4. J. Douglas Fletcher of Rosehaugh, Avoch, "Gille-Bride" (1692).
V. The Earl of Southesk, K.T., Kinnaird Castle, Brechin, "Prince Colin" (1878).
H. Kenneth MacDouall, Logan, Stranraer, "William of Farr" (1747).
C. Thomas A. Nelson, Ach-na-Cloich, Connel, Argyllshire, "Malachi" (1870).

Class 20. BULL, calved in 1903.—Premiums, £15, £10, £5, and £3.

1. Bullough's Trustees, Meggernie Castle, Aberfeldy, "Lord Clyde."
2. Allan Gilmour Thom of Canna, Oban, "Waverley."
3. The Countess-Dowager of Seafield, Castle Grant, Grantown, Strathspey, "King Malcolm."
4. Thomas V. Smith of Ardtornish, Morvern, R.S.O., "Valentine XXIII."
V. James D. Graham, Airthrey Castle, Bridge of Allan, "Domhnull Riabhaich of Airthrey."
H. D. A. Stewart, Ensay, Obbe, Portree, "Morair Sim."
C. Frederick Morgan of Glengorm, Tobermory, Mull, "Domhnull Mollach III. of Barguillean."

Class 21. BULL, calved in 1904.—Premiums, £12, £8, £4, and £2.

1. The Earl of Southesk, K.T., Kinnaird Castle, Brechin, "Saladin."
2. Sir William Ogilvy-Dalgleish of Errol, Bart., D.L., J.P., Errol Park, Errol, Perthshire, "Coruisk."
3. The Duke of Atholl, K.T., Blair Castle, Blair-Atholl, "Calum Buidhe 3rd of Atholl."
4. Thomas V. Smith of Ardtornish, Morvern, R.S.O., "Valentine XXIV."
V. The Countess-Dowager of Seafield, Castle Grant, Grantown, Strathspey, "MacDonnag Buidhe of Castle Grant."
H. D. A. Stewart, Ensay, Obbe, Portree, "Morair Og."
C. Thomas V. Smith of Ardtornish, Morvern, R.S.O., "Valentine XXV."

CLASS 22. COW, of any age, in Milk.—Premiums, £12, £8, £4, and £2.

1. The Duke of Atholl, K.T., Blair Castle, Blair-Atholl, "Te Riabhach 5th of Atholl" (5407).
2. Thomas V. Smith of Ardtornish, Morvern, R.S.O., "Sgiathach 15th" (3809).
3. Colonel E. D. Malcolm of Poltalloch, Poltalloch, Lochgilphead, "Nora Bheag."
4. William Sopper of Dunnaglass, Inverness, N.B., "Cattadale" (5766).

V. A. D. & D. M'Gregor, Kinlochmoidart, Moidart, R.S.O., "Bhan-a-mhuileach IV. of Kinlochmoidart" (3658).

H. A. D. & D. M'Gregor, Kinlochmoidart, Moidart, R.S.O., "Mari III. of Kinlochmoidart."

CLASS 23. HEIFER, calved in 1902.—Premiums, £10, £5, £3, and £2.

1. D. A. Stewart, Ensay, Obbe, Portree, "Laochag."
2. The Earl of Southesk, K.T., Kinnaird Castle, Brechin, "Princess Stella" (5870).
3. The Countess-Dowager of Seafield, Castle Grant, Grantown, Strathspey, "Tina II. of Castle Grant" (5839).
4. James D. Graham, Airthrey Castle, Bridge of Allan, "Mairi Odhar I. of Airthrey."

V. The Duke of Atholl, K.T., Blair Castle, Blair-Atholl, "Annag Riabhach 8th of Atholl."

H. The Earl of Southesk, K.T., Kinnaird Castle, Brechin, "Princess Dorothea" (5864).

C. John Stirling Ainsworth of Ardanaiseig, M.P., Ardanaiseig, Kilchrenan, "Ribhinn III. of Ardanaiseig."

CLASS 24. HEIFER, calved in 1903.—Premiums, £10, £5, £3, and £2.

1. The Earl of Southesk, K.T., Kinnaird Castle, Brechin, "Princess Almira."
2. The Countess Dowager of Seafield, Castle Grant, Grantown, Strathspey, "Empress Victoria."
3. T. V. Smith of Ardtornish, Morvern, R.S.O., "Sgiathach 43rd of Ardtornish."
4. The Duke of Atholl, K.T., Blair Castle, Blair-Atholl, "Te Riabhach 7th of Atholl."

V. D. A. Stewart, Ensay, Obbe, Portree, "Targeal."

H. William Sopper of Dunnaglass, Inverness, N.B., "Daphné Drusilla."

C. John Stirling Ainsworth of Ardanaiseig, M.P., Ardanaiseig, Kilchrenan, "Capleadh IV. of Ardanaiseig."

AYRSHIRE.

PRESIDENT'S CHAMPION MEDAL for best Ayrshire.

Robert Wilson, Manswrae, Bridge of Weir, "Harvey 6th of Manswrae" (14,239).

Best Ayrshire Bull in the Showyard—Champion Prize of £10, given by the Ayrshire Cattle Herd-Book Society.

James Kennedy, Glenshamrock, Auchinleck, "Safeguard of Glenshamrock" (4798).

Breeder of best Bull of any age in Classes 25, 26, *and* 27—The Silver Medal.

Robert Osborne, Morton Mains, Thornhill.

CLASS 25. BULL, calved before 1903.—Premiums, £12, £8, and £4.

1. James Kennedy, Glenshamrock, Auchinleck, "Safeguard of Glenshamrock" (4798).
2. James Howie, Hillhouse, Kilmarnock, "Wynflette" (5441).
3. Andrew Mitchell, Barcheskie, Kirkcudbright, "Duke of Lochlomond."

V. James M'Farlane, Oxhill, Buchlyvie, "Bold Stunner" (5278).

H. Andrew Semple, Rosebank, Midcalder, "Jam Jar of Rosebank."

CLASS 26. BULL, calved in 1903.—Premiums, £10, £7, and £3.

1. Thomas Barr, Monkland, Kilmarnock, "Zomo-sal" (5887).
2. James Howie, Hillhouse, Kilmarnock, "Give and Take" (5963).
3. Robert Osborne, Morton Mains, Thornhill, "Epicarmus" (5793).

CLASS 27. BULL, calved in 1904.—Premiums, £8, £5, and £3.

1. Robert Woodburn, Whitehill, Hurlford, "Rising Sun" (5826).
2. John Cochrane, Nether Craig, Kilmarnock, "Nether Craig Spicy Sam" (5927).
3. James Robb, Hindsward, Old Cumnock, "Money-maker" (5862).
V. Robert Osborne, Morton Mains, Thornhill, "Radient."
H. Robert Osborne, Morton Mains, Thornhill, "Alciphron."

Best Ayrshire Female in the Showyard—Champion Prize of £10, given by the Ayrshire Cattle Herd-Book Society.

Robert Wilson, Manswrae, Bridge of Weir, "Harvey 6th of Manswrae" (14,239).

CLASS 28. COW, calved before 1902, in Milk.—Premiums, £12, £8, and £4.

1. Robert Wilson, Manswrae, Bridge of Weir, "Harvey 6th of Manswrae" (14,239).
2. C. M. Douglas, M.P., Auchlochan, Lesmahagow, "Heather Blossom" (17,520).
3. James Lawrie, West Newton, Strathaven, "Bloomer VI." (16,645).
V. William R. Rodger, Crook Farm, Newton Mearns, "Crook Moss Rose" (16,140).
H. James Lawrie, West Newton, Strathaven, "Kate" (16,646).
C. John M'Alister, Ardyne, Toward, "Ardyne Fairy."

CLASS 29. COW, in Milk, calved after 1st January 1902.—Premiums, £10, £7, and £3.

1. James Neill, Barleith, Hurlford, Ayrshire, "Topsy 2nd of Barleith" (17,565).
2. Messrs Kerr, Old Graitney, Gretna, "Old Graitney Sonsie 6th" (17,605).
3. Robert M'Alister, Mid Ascog, Rothesay, "Queen 1st."
V. James Neill, Barleith, Hurlford, Ayrshire, "Hover-a-Blink 2nd of Barleith" (17,564).
H. John M'Alister, Ardyne, Toward, "Moss Rose of Ardyne."
C. Lieut.-Colonel Fergusson-Buchanan of Auchentorlie, Bowling, "Auchentorlie Lilla" (17,041).
C. John M'Alister, Ardyne, Toward, "Beauty of Ardyne."

CLASS 30. COW of any age, in Calf, or HEIFER calved in 1902, in Calf and due to calve within nine months after the Show.—Premiums, £10, £7, and £3.

1. Alexander Cross, Knockdon, Maybole, "Lady Jane" (13,820).
2. John M'Alister, Ardyne, Toward, "Jessie of Ardyne."
3. William Brown, Lodgebush, Craigie, Kilmarnock, "Kate of Springs."
V. Lieut.-Colonel Fergusson-Buchanan of Auchentorlie, Bowling, "Auchentorlie Marguerite" (17,044).
H. Matthew Hunter, Adamhill, Craigie, "Nannie."

1905 DERBY for Three-year-old AYRSHIRE QUEYS, organised by THE GLASGOW AGRICULTURAL SOCIETY, by which the prizes were offered. (14 Entries. Premiums, £6, £3, £2, £1, and Certificate.

(The Nominator of the Derby Winner will receive a Gold Medal from the Glasgow Agricultural Society.)

1. James Neill, Barleith, Hurlford, Ayrshire, "Topsy 2nd of Barleith" (17,565).
2. Messrs Kerr, Old Graitney, Gretna, "Old Graitney Sonsie 6th" (17,605).
3. James Neill, Barleith, Hurlford, Ayrshire, "Hover-a-Blink 2nd of Barleith" (17,564).
4. John M'Alister, Ardyne, Toward, "Moss Rose of Ardyne."
5. Lieut.-Col. Fergusson-Buchanan of Auchentorlie, Bowling, "Auchentorlie Lilla" (17,041).

CLASS 31. HEIFER, calved in 1903.—Premiums, £10, £5, and £3.

1. James Howie, Hillhouse, Kilmarnock, "Snowdrift" (17,193).
2. Robert Osborne, Morton Mains, Thornhill, "Selina Sedilia" (17,442).
3. Andrew Mitchell, Barcheskie, Kirkcudbright, "Handsome Nell" (17,536).
V. Thomas Barr, Monkland, Kilmarnock, "Sumphie."
H. Andrew Mitchell, Barcheskie, Kirkcudbright, "Sweet Briar."

CLASS 32. HEIFER, calved in 1904.—Premiums, £8, £5, and £3.

1. James Howie, Hillhouse, Kilmarnock, "Whinflower."
2. James Howie, Hillhouse, Kilmarnock, "Semolina."
3. Robert Osborne, Morton Mains, Thornhill, "Faustina Scaiffe."
V. Thomas Barr, Monkland, Kilmarnock, "Bonny Nancy."

HORSES

FOR AGRICULTURAL PURPOSES.

DRAUGHT STALLIONS.

PRESIDENT'S CHAMPION MEDAL for best Clydesdale Stallion or Colt.

W. S. Park, Hatton, Bishopton, "Royal Chattan" (11,489).

Breeder of best Male Animal of any age in Classes 33 *to* 36—The Silver Medal.

John Findlay, Springhill, Baillieston.

CLASS 33. STALLION, foaled before 1902—Premiums, £20, £15, £10, and £4.

1. W. S. Park, Hatton, Bishopton, "Royal Chattan" (11,489).
2. William Dunlop, Dunure Mains, Ayr, "Baron of Buchlyvie."
3. George Alston, Loudoun Hill, Darvel, "Revelanta" (11,876).
4. A. & W. Montgomery, Netherhall and Banks, Kirkcudbright, "Acme" (10,485).
V. John Findlay, Springhill, Baillieston, "Baden Powell" (10,963).
H. A. & W. Montgomery, Netherhall and Banks, Kirkcudbright, "Baron's Chief" (10,971).
C. James Kilpatrick, Craigie Mains, Kilmarnock, "Sir Horace" (11,941).

CLASS 34. ENTIRE COLT, foaled in 1902.—Premiums, £20, £15, £10, and £4.

1. James Kilpatrick, Craigie Mains, Kilmarnock, "Perpetual Motion" (12,272).
2. A. & W. Montgomery, Netherhall and Banks, Kirkcudbright, "Silver Crest" (12,358).
3. William Clark, Netherlea, Cathcart, "Dunure Link" (12,131).
4. William Renwick, Meadowfield, Corstorphine, "Margrave" (12,240).
V. A. B. Matthews, Newton-Stewart, N.B., "Stalwart" (12,380).
H. Robert Watson, Auchincarroch, Alexandria, "Baron Leven."
C. James Kilpatrick, Craigie Mains, Kilmarnock, "Lancer" (12,205).

CLASS 35. ENTIRE COLT, foaled in 1903.—Premiums, £20, £12, £8, and £4.

1. A. & W. Montgomery, Netherhall and Banks, Kirkcudbright, "Baron Fyvie" (12,451).
2. William Clark, Netherlea, Cathcart, "Dunnydeer" (12,557).
3. George A. Ferguson, Surradale, Elgin, "Allandale" (12,418).
4. Thomas Smith, Blacon Point, Chester, "British Chief" (12,500).
V. James Kilpatrick, Craigie Mains, Kilmarnock, "Wheel of Fortune" (12,784).
H. James Gray, Birkenwood, Gargunnock, "Debonair."
C. D. Riddle, Blackhall, Paisley.

CLASS 36. ENTIRE COLT, foaled in 1904.—Premiums, £15, £10, £6, and £4.

1. A. & W. Montgomery, Netherhall and Banks, Kirkcudbright.
2. James Kilpatrick, Craigie Mains, Kilmarnock.
3. James Dunlop, Barassie Farm, Troon, "Baron's Conqueror."
4. W. S. Park, Hatton, Bishopton.
V. William M'Laren, Inch, Kincardine-on-Forth.
H. A. & W. Montgomery, Netherhall and Banks, Kirkcudbright.
C. Lord Polwarth, Mertoun House, St Boswells, "Border Scott."

1905 DERBY for YEARLING CLYDESDALE COLTS, organised by THE GLASGOW AGRICULTURAL SOCIETY, by which the prizes were offered—Premiums, £8, £4, £2, £1, and Certificate. (12 Entries.)

(The Nominator of the Winner will receive a Gold Medal from the Glasgow Agricultural Society.)

1. James Kilpatrick, Craigie Mains, Kilmarnock. (No. 380.)
2. William Clark, Netherlea, Cathcart. (No. 376.)
3. James Kilpatrick, Craigie Mains, Kilmarnock. (No. 381.)

DRAUGHT GELDINGS.

PRESIDENT'S CHAMPION MEDAL for best Draught Gelding.

George Hodgson, Carlatton, Carlisle, "King Harry."

CLASS 37. DRAUGHT GELDING, foaled before 1902.—Premiums, £10, £5, and £3.

1. George Hodgson, Carlatton, Carlisle, "King Harry."
2. William Clark, Netherlea, Cathcart, "Best of All."
3. John Pollock Stewart, Thornley Park, Paisley, "Excelsior."
H. David Hastie & Sons, Stonefield Farm, Blantyre, "Johnny."
C. J. & W. Meiklem, Begg, Kirkcaldy, "Harry."

CLASS 38. DRAUGHT GELDING, foaled in 1902.—Premiums, £6, £4, and £3.

1. William Clark, Netherlea, Cathcart, "Matchless."
2. Alexander Clark, Newton Farm, Markinch, "Blackheath."
3. J. & W. Meiklem, Begg, Kirkcaldy, "Jo."

CLASS 39. DRAUGHT GELDING, foaled in 1903.—Premiums, £6, £4, and £3.

1. William Clark, Netherlea, Cathcart, "Captain."
2. George Hodgson, Carlatton, Carlisle.
3. Alexander Clark, Newton Farm, Markinch, "Admiral."
C. John Pollock Stewart, Thornley Park, Paisley, "Oku."

DRAUGHT MARES AND FILLIES.

PRESIDENT'S CHAMPION MEDAL for best Clydesdale Mare or Filly.

William Park, Brunstane, Portobello, "Rosadora."

Best Clydesdale Mare or Filly registered in the Clydesdale Stud-Book—Cawdor Challenge Cup, value 50 guineas, given by the Clydesdale Horse Society.

William Park, Brunstane, Portobello, "Rosadora."

Breeder of Best Clydesdale Brood Mare—The Robert Murdoch Prize, value £10.

Alexander Williamson, Spyland, Kirkcudbright.

CLASS 40. MARE of any age, with Foal at foot.—Premiums, £20, £12, £7, and £4.

1. James Boyd of Cariskey, Southend, Kintyre, "Topsy Pride" (15,394).
2. Stephen Mitchell of Boquhan, Kippen, "Royal Ruby."
3. J. Ernest Kerr, Harviestoun Castle, Dollar, "Chester Princess."
4. John M'Kay, Crossmill Farm, Barrhead, "Miss Taylor."
V. Sir John Gilmour of Montrave, Bart., Leven, Fife, "Montrave Rena."
H. J. Douglas Fletcher of Rosehaugh, Avoch, "Baroness Macgregor."
C. James Crawford, Floshend, Gretna, "Countess of Gretna."
C. A. B. Matthews, Newton-Stewart, N.B., "Queen Alexandra."

CLASS 41. YELD MARE, foaled before 1902.—Premiums, £12, £9, £6, and £4.

1. J. Ernest Kerr, Harviestoun Castle, Dollar, "Pyrene."
2. Seaham Harbour Stud, Limited, The Dene, Seaham Harbour, "Kitty Everard" (15,260).
3. Sir John Gilmour of Montrave, Bart., Leven, Fife, "Montrave Dorothy."
4. William Murdoch, East Hallside Farm, Newton, "Scottish Jess" (15,713).
V. G. & J. Cocker, Hill of Petty, Fyvie, "Madge."
H. Captain John Hope, R.N., St Mary's Isle, Kirkcudbright, "Montrave Sapphire."
C. Seaham Harbour Stud, Limited, The Dene, Seaham Harbour, "Rosebud" (14,397).

CLASS 42. YELD MARE or FILLY, foaled in 1902.—Premiums, £12, £9, £6, and £4.

1. James Gray, Birkenwood, Gargunnock, "Lady Madge."
2. Robert Chapman, Johnston, Gartcosh, "Winsome Baroness."
3. Sir John Gilmour of Montrave, Bart., Leven, Fife, "Montrave Rosalind."
4. J. Ernest Kerr, Harviestoun Castle, Dollar, "Ambrosine."
V. Robert Maclean of Drynie, Inverness, "Gloaming."
H. Herbert Webster, Morton House, Fence Houses, "Lady Alexandria."
C. Iain Ramsay of Kildalton, Port Ellen, "Lady Monday."

CLASS 43. FILLY, foaled in 1903.—Premiums, £12, £9, £6, and £4.

1. William Park, Brunstane, Portobello, "Rosadora."
2. J. Ernest Kerr, Harviestoun Castle, Dollar, "Veronique."
3. Stephen Mitchell of Boquhan, Kippen, "Beatrice."
4. Seaham Harbour Stud, Limited, The Dene, Seaham Harbour, "Silver Princess."
V. Wilson Hodgson, Lowther Arms, Burgh by Sands, Carlisle, "Fair Lothian."
H. Richard Dunn, Udston, Hamilton, "Sea Foam."
C. Robert Forrest, Knockinlaw, Kilmarnock, "Pride of Knockinlaw."

CLASS 44. FILLY, foaled in 1904.—Premiums, £12, £9, £6, and £4.

1. St Clair Cunningham, Hedderwick Hill, Dunbar.
2. Sir John Stirling Maxwell, Bart., M.P., Pollok House, Pollokshaws, "Wenonah."
3. Francis Elliot, Middlestots, Duns.
4. J. Ernest Kerr, Harviestoun Castle, Dollar.
V. Robert Forrest, Knockinlaw, Kilmarnock, "Rose of Knockinlaw."
H. Alexander Guild, Aberlady Mains, Aberlady, "Evelyn Black."
C. R. & J. Kerr, Lochlane, Crieff, "Lady Lindo."
C. James Fleming, Friock Mains, Friockheim, "Royal Lady."
C. James Calder of Ardargie, Forgandenny, Perthshire, "Favourite Queen."

1905 DERBY for YEARLING CLYDESDALE FILLIES, organised by THE GLASGOW AGRICULTURAL SOCIETY, by which the prizes were offered.—Premiums, £14, £7, £3, £2, £1, and Certificate. (19 Entries.)

(The Nominator of the Winner will receive a Gold Medal from the Glasgow Agricultural Society.)

1. St Clair Cunningham, Hedderwick Hill, Dunbar. (No. 471.)
2. Sir John Stirling Maxwell, Bart., M.P., Pollok House, Pollokshaws, "Wenonah."
3. Robert Forrest, Knockinlaw, Kilmarnock, "Rose of Knockinlaw."
4. R. & J. Kerr, Lochlane, Crieff, "Lady Lindo."
5. James Calder of Ardargie, Forgandenny, Perthshire, "Favourite Queen."

DRAUGHT GELDINGS IN HARNESS.

PRESIDENT'S CHAMPION MEDAL for best Gelding in Harness.

Scottish Co-operative Wholesale Society, Limited, 95 Morrison Street, Glasgow, "Regent."

CLASS 45. DRAUGHT GELDINGS, any age, in Harness, it being a condition that the horses must have been regularly worked on the streets of Glasgow for a period of twelve weeks prior to the first day of the Show—the horses to be exhibited on Thursday, 6th July, only; the prize-winners to take part, if required, in both parades on Thursday and Friday—Prizes, £5, £3, and £2, given by Mr W. Clark, Netherlea.

1. Scottish Co-operative Wholesale Society, Limited, 95 Morrison Street, Glasgow, "Regent."
2. Scottish Co-operative Wholesale Society, Limited, 95 Morrison Street, Glasgow, "Watty."
3. Scottish Co-operative Wholesale Society, Limited, 95 Morrison Street, Glasgow, "Johnny."
V. William M'Ewan & Co., Limited, 88 Renfrew Street, Glasgow, "Bob."
H. Pearson, Beckitt, & Co., Rockvilla Oil Mills, Glasgow, "The Bishop."
C. Alexander Ritchie, 8 Croy Place, Maxwell Street, Glasgow, "Sandy."
C. William M'Millan, 73 Smith Street, Govanhill, Glasgow, "Davie."
C. Andrew Motherwell, 268 Main Street, Gorbals, Glasgow.

HUNTERS.

PRESIDENT'S CHAMPION MEDAL for best Hunter.

John Henry Stokes, Nether House, Great Bowden, Market Harboro, Gelding, "Baronet."

Best Hunter Filly in Classes 46, 47, *and* 48—Gold Medal, value £10, 10s., given by the Hunter Improvement Society.

Andrew Saunders, Cubby Hill, Longtown, Filly, "Scotch March" (2140).

CLASS 46. COLT, GELDING, or FILLY, foaled in 1904, the produce of thoroughbred Stallions, out of Mares of any breed.—Five Prizes—£10, £7, £5, £2, and £1, given by Sir John Gilmour of Montrave, Bart.

1. James S. Carmichael, Arthurstone, Meigle, Perthshire, Gelding, "Marvel."
2. Captain Clayhills Henderson, R.N., of Invergowrie, Dundee, Colt, "Wonder."
3. Captain Clayhills Henderson, R.N., of Invergowrie, Dundee, Colt, "Marvellous."
4. Donald Fraser, Bethune Arms Hotel, Markinch, Colt, "General" (2064).
5. J. Harling Turner, Cessnock, Galston, Gelding, "Jonie."
H. John James, Manor House, Oughterside, Bullgill, Gelding.

CLASS 47. FILLY, MARE, or GELDING, for field, foaled in 1903, *in hand*.—Premiums, £8, £5, and £3.

1. Andrew Saunders, Cubby Hill, Longtown, Filly, "Scotch March" (2140).
2. William Lee Carlyle, Templehill, Ecclefechan, Colt, "Dandie."
3. Andrew Wilson, Esbie, Lochmaben, Filly, "Lady Dancer" (3001).
V. Mrs Johnstone, Broadholm, Lockerbie, Filly.
H. William Lee Carlyle, Templehill, Ecclefechan, Filly, "Dawn."

CLASS 48. YELD MARE, FILLY, or GELDING, for field, foaled in 1902, *in hand*.—Premiums, £8, £5, and £3.

1. John Claude Martin of Netherwood, Dumfries, Filly, "Eva."
2. Captain Clayhills Henderson, R.N., of Invergowrie, Dundee, Gelding, "Blair."
3. A. Alexander, Cockburn Hill, Balerno, Filly, "Ballet Girl."
C. R. R. Rothwell, Estate Office, Miller Arcade, Preston, Gelding, "Ridsdale."

CLASS 49. Four-year-old HUNTERS, to carry over 13 stones 7 lb.—Premiums, £20, £10, and £5.

1. John Henry Stokes, Nether House, Great Bowden, Market Harboro, Gelding, "Artist."
2. John Henry Stokes, Nether House, Great Bowden, Market Harboro, Gelding, "Ebony."
3. Thomas and Henry Ward, Pinchinthorpe, Great Ayton, Gelding, "Ireland."

CLASS 50. Four-year-old HUNTERS, to carry 12 stones to 13 stones 7 lb.—Premiums, £20, £10, and £5.

1. John Henry Stokes, Nether House, Great Bowden, Market Harboro, Gelding, "Kitchener."
2. Alexander Cross, Langbank, Renfrewshire, Gelding, "Dramatist."
3. John Henry Stokes, Nether House, Great Bowden, Market Harboro, Gelding, "Warminster."
V. Lewis Beattie, Mossknowe, Canonbie, Gelding, "Rainbow" (1333).
H. George Russell, Hatton, Lundin Links, Gelding, "Thunderbolt."
C. James S. Carmichael, Arthurstone, Meigle, Perthshire, Gelding, "Whitebait."

CLASS 51. AGED HUNTERS, to carry over 15 stones—Premiums, £25, £15, and £7.

1. John Henry Stokes, Nether House, Great Bowden, Market Harboro, Gelding, "Baronet."
2. John Henry Stokes, Nether House, Great Bowden, Market Harboro, Gelding, "Gay Hampton."
3. Archibald Kerr, Mouswald Townhead, Ruthwell, Mare, "Madame."
V. James Baird Thorneycroft, Netherplace, Mauchline, Gelding, "Arundel" (1330).
H. J. Harling Turner, Cessnock, Galston, Gelding, "Afton."

CLASS 52. AGED HUNTERS, to carry 13 stones 7 lb. to 15 stones—Premiums, £50, £30, £20, and £10.

1. John Henry Stokes, Nether House, Great Bowden, Market Harboro, Gelding, "Gold-reef."
2. John Henry Stokes, Nether House, Great Bowden, Market Harboro, Mare, "Lady Emily" (1929).
3. John Henry Stokes, Nether House, Great Bowden, Market Harboro, Gelding, "Pat."
4. Alex. Cross, Langbank, Renfrewshire, Gelding, "Feeding Box."

V. Thomas and Henry Ward, Pinchinthorpe, Great Ayton, Gelding.
C. Hon. G. R. Vernon, Auchans, Kilmarnock, Gelding, "Badger."

CLASS 53. AGED HUNTERS, to carry 12 stones to 13 stones 7 lb.—Premiums, £25, £15, and £7.

1. John Henry Stokes, Nether House, Great Bowden, Market Harboro, Mare, "Rosebud."
2. Archibald Kerr, Mouswald Townhead, Ruthwell, Mare, "Clashrue."
3. Major M'Kie, of Ernespie, Castle-Douglas, Gelding, "The Dutchman."

V. Thomas and Henry Ward, Pinchinthorpe, Great Ayton, Gelding.
H. Mrs Ninian B. Stewart, Dunloe, Wemyss Bay, Renfrewshire, Gelding, "Kibworth."
C. George Barclay, Thornhill, Johnstone, Gelding.

EXTRA STOCK.

The following was Very Highly Commended, and a Medium Silver Medal awarded.

W. Cecil Richard, 29 Chester Street, Edinburgh, Gelding, "Sam Weller."

For Hunters, four-year-old and upwards, exhibited in the Hunter Classes, owned by tenant-farmers whose chief occupation is farming, and hunted by them with any established pack of fox-hounds in Scotland in the season 1904-5—Prizes, £15, £10, £5.

1. Archibald Kerr, Mouswald Townhead, Ruthwell, Mare, "Clashrue."
2. Archibald Kerr, Mouswald Townhead, Ruthwell, Mare, "Madame."
3. Lewis Beattie, Mossknowe, Canonbie, Gelding, "Rainbow" (1333).

V. George Russell, Hatton, Lundin Links, Gelding, "Thunderbolt."
H. William Taylor, Park Mains, Renfrew, Gelding, brown.

For Hunters, four-year-old and upwards, exhibited in the Hunter Classes, the property of members of any established pack of fox-hounds in Scotland, and hunted by them in Scotland during season 1904-5, *to carry* 13 *to* 15 *stone*—Prizes, £12, £8, and £4.

1. Archibald Kerr, Mouswald Townhead, Ruthwell, Mare, "Clashrue."
2. Archibald Kerr, Mouswald Townhead, Ruthwell, Mare, "Madame."
3. W. Cecil Richard, 29 Chester Street, Edinburgh, Gelding, "Sam Weller."

C. Lewis Beattie, Mossknowe, Canonbie, Gelding, "Rainbow" (1333).

For Hunters exhibited in the Hunter Classes, regularly hunted (not necessarily owned) *by ladies with any established pack of fox-hounds in Scotland during season* 1904-5, *to carry* 12 *to* 13 *stone*—Prizes, £12, £8, and £4.

1. Mrs Ninian B. Stewart, Dunloe, Wemyss Bay, Renfrewshire, Gelding, "Kibworth."
2. Mrs Shaw, Benalt, Ayr, Gelding, "Dunabie."
3. Miss Ramsay, Cairnmore, Port Ellen, Gelding, "Charlie."

CLASS 54. HUNTER BROOD MARE, with Foal at Foot or to foal this season.—Premiums, £20, £10, and £5, given by Captain Clayhills Henderson of Invergowrie, R.N.

1. Robert Wallace, Townhead of Drumley, Annbank Station, "Fire Escape" (1864).
2. J. A. Campbell, Craigie House, Ayr, "Rastrever."
3. Captain Clayhills Henderson, R.N., of Invergowrie, Dundee, "Princess Patricia" (1176).

V. J. Harling Turner, Cessnock, Galston, "Nora."
C. Major M'Kie, of Ernespie, Castle-Douglas, "Dorothy Vane"

HACKNEYS.

(ALL TO BE SHOWN IN HAND.)

PRESIDENT'S CHAMPION MEDAL for best Hackney.

Stephen Cliff, Wyndham Hall, Crayke, Easingwold, Mare, "Crayke Czarina" (15,715).

Best Mare or Filly in Hackney or Pony Classes—Champion Prize of £10, or a Gold Medal of the same value, at the option of the Exhibitor, given by the Hackney Horse Society.

Stephen Cliff, Wyndham Hall, Crayke, Easingwold, Mare, "Crayke Czarina" (15,715).

CLASS 55. BROOD MARE, 15 hands and upwards, with Foal at Foot or to foal this season to a registered sire. Registered in the Hackney Stud-Book.—Premiums, £10, £6, and £4.

1. Iain Ramsay of Kildalton, Port Ellen, Islay, "Ardimersay Juliet" (15,570).
2. A. M'Kerrow, Camphill, Bearsden, "Wawne Princess" (10,602).
3. A. Rennie, Wellmeadow, Paisley, "Cosmic" (11,719).

CLASS 56. BROOD MARE, under 15 hands, with Foal at Foot or to foal this season to a registered sire. Registered in the Hackney Stud-Book.—Premiums, £10, £6, and £4.

1. Alexander Morton, Gowanbank, Darvel, "Genevieve" (13,502).

CLASS 57. YELD MARE or FILLY, foaled in 1902. Registered in the Hackney Stud-Book.—Premiums, £8, £5, and £3.

1. Stephen Cliff, Wyndham Hall, Crayke, Easingwold, Mare, "Crayke Czarina" (15,715).
2. Carr & Co., Carluke, N.B., Mare, "Napham Molly" (17,073).
3. John Kerr, M.P., Gaddesden Place, Hemel Hempstead, Mare, "Coldspring Evaline" (16,536).

V. Thomas Hall, Copmanthorpe Grange, York, Filly, "Copmanthorpe Princess."
H. John F. Christie, Levenfield, Alexandria, Mare, "Kiomi."
C. Stephen Mitchell, Boquhan, Kippen, Mare, "Boquhan Sunflower" (16,468).

CLASS 58. FILLY, foaled in 1903. Registered in the Hackney Stud-Book.—Premiums, £8, £5, and £3.

1. J. Ernest Kerr, Harviestoun Castle, Dollar, "Broxton Geltlette" (16,494).

CLASS 59. FILLY, foaled in 1904, eligible for entry in the Hackney Stud-Book.—Premiums, £8, £5, and £3.

1. Thomas Hall, Copmanthorpe Grange, York, "Copmanthorpe Duchess."
2. Carr & Co., Carluke, N.B., "Carluke Queen."
3. John G. Stewart, Ault-Wharrie, Dunblane, "Lady Mattie."

CLASS 60. STALLION, foaled in or before 1902, over 15 hands. Registered in the Hackney Stud-Book.—Premiums, £10, £6, and £4.

1. A. Rennie, Wellmeadow, Paisley, "The Autocrat" (7294).
2. Alfred A. Haley, Whitewall, Malton, "Dumbarton" (8447).
3. Carr & Co., Carluke, N.B., "Sancton Squire" (7980).

CLASS 61. STALLION, foaled in or before 1902, over 14 and not over 15 hands. Registered in the Hackney Stud-Book.—Premiums, £10, £6, and £4.

1. Alex. Morton, Gowanbank, Darvel, "Kingcup."
2. Arthur Percy Sowerby, Stud Farm, Brustuck, Hull, "Snip" (7625).

CLASS 62. ENTIRE COLT, foaled in 1903. Registered in the Hackney Stud-Book.—Premiums, £8, £5, and £3.

1. Right Hon. Frederick Wrench, Killacoona, Ballybrack, Ireland, "Fitz Clare" (8852).
2. Carr & Co., Carluke, N.B., "Torchfire."
3. John F. Christie, Levenfield, Alexandria, "Bravo."
V. Robert Wilson, Westwood, Dunlop, "Dunlop Prince."
H. Joseph Campbell, Balloch Livery Stables, Balloch, "Carleton Surprise."
C. W. Mitchell & Sons, Ayr, "Gloriation" (8866).

CLASS 63. ENTIRE COLT, foaled in 1904, eligible for entry in the Hackney Stud-Book.—Premiums, £8, £5, and £3.

1. James M'Arthur, Old Fargie, Gateside, "Fargie Duke."
2. John Highet, Laighmuir Villa, Dunlop.

PONIES.

PRESIDENT'S CHAMPION MEDAL for best Pony.

William S. Miller, The Moorings, Dumbreck, Glasgow, "Horace Junior."

CLASS 64. STALLION, 3 years old and upwards, over 12, not exceeding 14 hands, *in hand*.—Premiums, £5, £3, and £2.

1. William S. Miller, The Moorings, Dumbreck, Glasgow, "Horace Junior."
2. A. Blackburn Craig, 97 Maxwell Drive, W. Pollokshields, Glasgow, "Bantam King" (13,111).
3. Seaham Harbour Stud, Ltd., The Dene, Seaham Harbour, "Seaham Roosevelt"

CLASS 65. STALLION, 3 years old and upwards, 12 hands and under, *in hand*.—Premiums, £5, £3, and £2.

1. D. P. M'Donald & Sons, Distilleries, Fort William, "Dandy."

CLASS 66. YELD MARE, FILLY, or GELDING, 3 years old and upwards, over 13 and not over 14 hands, *in saddle*.—Premiums, £5, £3, and £2.

1. James Buchanan, Elcho Street, near Graham Square, Glasgow, Mare, "Tansy" (14,771).
2. Alexander Stewart, 129 Whitehill Street, Dennistoun, Glasgow, Mare, "Kate Stewart."
3. George Wolfe, Millburn, Bathgate, Gelding, "Millburn Squire."
V. C. Y. Kinloch of Gourdie, Murthly, Mare, "Orba" (15,349).

CLASS 67. YELD MARE, FILLY, or GELDING, 3 years old and upwards, over 12 and not over 13 hands, *in saddle*.—Premiums, £5, £3, and £2.

1. Jack Dove, Broxtowe, Pollokshields, Glasgow, Mare, "Broxtowe Tit-Bits."
2. George Wolfe, Millburn, Bathgate, Gelding, "Millburn Bantam."
3. Miss Marianne Anderson, Barskimming, Mauchline, Ayrshire, Gelding, "Darkness."
V. J. Ernest Kerr, Harviestoun Castle, Dollar, Mare, "Marcelline."
H. D. F. Lauder, Mollands, Callander, Filly, "Cleo."

CLASS 68. YELD MARE, FILLY, or GELDING, 3 years old and upwards, 12 hands and under, *in hand*.—Premiums, £5, £3, and £2.

1. John Highet, Laighmuir Villa, Dunlop, Mare, "Glib."
2. Andrew Lowe, Oswald Road, Gallatown, Kirkcaldy, Gelding, "Little Robbie."
3. Jack Dove, Broxtowe, Pollokshields, Glasgow, Mare, "Eudora."
V. J. Lauder, Mill of Keir, Dunblane, Gelding, "Peter."
H. John F. Christie, Levenfield, Alexandria, Mare.
C. Miss Marianne Anderson, Barskimming, Mauchline, Ayrshire, Gelding, "Haskell."

POLO AND RIDING PONIES.

PRESIDENT'S CHAMPION MEDAL for best Polo or Riding Pony.

The Marquis of Tullibardine, M.V.O., D.S.O., Blair Castle, Blair-Atholl, N.B., "Mahmud" (296).

CLASS 69. STALLION, 3 years old and upwards, 13.2 and not exceeding 14.2 hands, entered in the Polo and Riding Pony Stud-Book, or got by a Registered Polo Pony sire or out of a Registered Polo Pony dam.—Premiums, £5, £3, and £2.

1. The Marquis of Tullibardine, M.V.O., D.S.O., Blair Castle, Blair-Atholl, N.B., "Mahmud" (296).
2. J. H. Munro Mackenzie, Calgary, Isle of Mull, "The Syrian" (110).

CLASS 70. YELD MARE, FILLY, or GELDING, 3 years old or upwards, 13.2 and not exceeding 14.2 hands, entered in the Polo and Riding Pony Stud-Book, or got by a Registered Polo Pony sire, or out of a Registered Polo Pony dam.—Premiums, £5, £3, and £2.

2. J. H. Munro Mackenzie, Calgary, Isle of Mull, Gelding, "Wild Meadow."

COBS.

PRESIDENT'S CHAMPION MEDAL for best Pony in Class 71.

Alexander Cross, Langbank, Renfrewshire, Gelding, "Boland."

CLASS 71. RIDING COB or PONY, not eligible by pedigree or type for any of the other Pony Classes, from 13.2 to 15 hands.—Premiums, £5, £3, and £2.

1. Alexander Cross, Langbank, Renfrewshire, Gelding, "Boland."
2. J. H. Munro Mackenzie, Calgary, Isle of Mull, Gelding, "Gay Lad."

HIGHLAND PONIES.

PRESIDENT'S CHAMPION MEDAL for best Highland Pony.

The Duke of Atholl, K.T., Blair Castle, Blair-Atholl, "Bonnie Laddie" (329).

Best Stallion or Entire Colt in Classes 72 *and* 73—Special Prize of £5, 5s. and Silver Medal, given by the Polo and Riding Pony Society.

Donald Stewart, Drumchorry, Pitlochry, "Glen Bruar" (331).

CLASS 72. HIGHLAND PONY STALLION, 3 years old or upwards, not exceeding 14.2 hands, entered or accepted for entry in the Highland Section of the Polo Pony Stud-Book.—Premiums, £5, £3, and £2.

1. Donald Stewart, Drumchorry, Pitlochry, "Glen Bruar" (331).
2. W. D. Mackenzie of Farr and Newbie, Daviot, Inverness, "Beaufort."
3. J. H. Munro Mackenzie, Calgarry, Isle of Mull, "Islesman" (253).

EXTRA STOCK.

The following was Very Highly Commended, and a Medium Silver Medal awarded.

The Duke of Atholl, K.T., Blair Castle, Blair-Atholl, "Bonnie Laddie" (329).

CLASS 73. HIGHLAND PONY ENTIRE COLTS, foaled in 1903 or 1904.—Premiums, £5, £3, and £2.

1. J. H. Munro Mackenzie, Calgary, Isle of Mull, "Mull."
2. Edward Ormiston, Gaick Forest, Kingussie, "Hieland Stamp."

Best Mare in Class 74—Special Prize of £5, 5s. and Silver Medal, given by the Polo and Riding Pony Society.

Donald Stewart, Drumchorry, Pitlochry, "Mountain Maid" (1312).

CLASS 74. HIGHLAND PONY MARE, 3 years old or upwards, not exceeding 14.2 hands, Yeld or with Foal at foot, entered or accepted for entry in the Highland Section of the Polo Pony Stud-Book.—Premiums, £5, £3, and £2.

1. Donald Stewart, Drumchorry, Pitlochry, "Mountain Maid" (1312).
2. J. H. Munro Mackenzie, Calgary, Isle of Mull, "Molly" (1311).
3. Lord Willoughby D'Eresby, Glenartney Forest, Comrie, N.B., "Jenny."

SHETLAND PONIES.

(ALL TO BE SHOWN IN HAND.)

PRESIDENT'S CHAMPION MEDAL for best Shetland Pony.

R. W. R. Mackenzie, Earlshall, Leuchars, "Marquis."

Best Group of Shetland Ponies, consisting of a Male and three Females, exhibited in the Ordinary Classes—Model in Bronze of a Shetland Pony, executed from life by Mr Robert Alexander, R.S.A., given by Mr Charles Douglas, M.P.

R. W. R. Mackenzie, Earlshall, Leuchars. (Nos. 686, 716, 717, 727.)

CLASS 75. STALLION, not exceeding 10½ hands, foaled before 1902.—Premiums, £5, £3, and £2.

1. R. W. R. Mackenzie, Earlshall, Leuchars, "Marquis."
2. Sir Edward Stewart-Richardson, Bart., Pitfour Castle, Perth, "Benedict."
3. Robert Baird, Glenbank, Lenzie, "Prince of Wales" (278).

V. William Mungall of Transy, Dunfermline, "Dauntless."
H. Charles Douglas, M.P., Auchlochan, Lesmahagow, "Eric."
C. F. S. Kennedy, Mill Inn, Milltimber, Aberdeen, "Cock of the North."
C. William Mungall of Transy, Dunfermline, "Seaweed."
C. David Stewart, Blantyre Park, High Blantyre, "Siegfried."

CLASS 76. ENTIRE COLT, not exceeding 10½ hands, foaled in 1902 or 1903.—Premiums, £5, £3, and £2.

1. Charles Douglas, M.P., Auchlochan, Lesmahagow, "Crown Prince."
2. Miss M. Nicol, Roscobie, Banchory, N.B., "Titmouse."
3. R. W. R. Mackenzie, Earlshall, Leuchars, "Rabbi."

V. George A. Miller, Lawmuir, Methven, "Boy Blue."
H. Miss M. Nicol, Roscobie, Banchory, N.B., "Tip-top."
C. Charles Douglas, M.P., Auchlochan, Lesmahagow, "Aikendrum."

CLASS 77. MARE, not exceeding 10½ hands, with Foal at foot.—Premiums, £5, £3, and £2.

1. William Mungall of Transy, Dunfermline, "Stella" (1692).
2. R. W. R. Mackenzie, Earlshall, Leuchars, "Bracelet" (1604).
3. George A. Miller, Lawmuir, Methven, "Barbara."

V. John Sharp, Balmuir, Dundee, "Princess Ena" (1679).
H. Miss M. Nicol, Roscobie, Banchory, N.B., "Froda."
C. Charles Douglas, M P., Auchlochan, Lesmahagow, "Heather Bonnie."

CLASS 78. YELD MARE, not exceeding 10½ hands.—Premiums, £5, £3, and £2.

1. R. W. R. Mackenzie, Earlshall, Leuchars, "Gold Flower."
2. William Mungall of Transy, Dunfermline, "Silver Queen" (1197).
3. Francis N. M. Gourlay, Broomfield, Moniaive, Dumfriesshire, "Delia."

V. R. W. R. Mackenzie, Earlshall, Leuchars, "Rose."
H. William Chapman, Ballemenoch, Glenfruin, Helensburgh, "Danish Queen" (1424).
C. William Little, Gladenholm, Amisfield, R.S.O., Dumfriesshire, "Speedwell."

EXTRA STOCK.

The following was Very Highly Commended, and a Medium Silver Medal awarded.

R. W. R. Mackenzie, Earlshall, Leuchars, "Strawberry."

CLASS 79. FILLY, not exceeding 10½ hands, foaled in 1902 or 1903.—Premiums, £5, £3, and £2.

1. William Mungall of Transy, Dunfermline, "Thoralind."
2. R. W. R. Mackenzie, Earlshall, Leuchars, "Bellwort."
3. William Mungall of Transy, Dunfermline, "Fearless."
V. George A. Miller, Lawmuir, Methven, "Hermia."
H. David Stewart, Blantyre Park, High Blantyre, "Roma."
C. Charles Douglas, M.P., Auchlochan, Lesmahagow, "Pandora."
C. Francis N. M. Gourlay, Broomfield, Moniaive, Dumfriesshire, "Operette."
C. William Mungall of Transy, Dunfermline, "Silver Bell."

DRIVING COMPETITIONS.

PRESIDENT'S CHAMPION MEDAL for best animal in the Classes for Horses in Harness. An Animal that has won a President's Medal in another section in this Show shall not be eligible to compete for the Medal in this section.

Arthur E. Evans, Bronwylfa, Wrexham, Mare, "Princess" (15,065).

Champion Prize of Twenty Guineas for best Horse in the Driving Classes, shown in competition for this prize, in single Harness.

Arthur E. Evans, Bronwylfa, Wrexham, Mare, "Princess" (15,065).

CLASS 80. STALLION, MARE, FILLY, or GELDING, over 15.1 hands.—Premiums, £20, £10, and £5.

1. Arthur E. Evans, Bronwylfa, Wrexham, Mare, "Princess."
2. James Prentice, Carolside, Uddingston, Mare, "Bryony."
3. Carr & Co., Carluke, "Sancton Squire" (7980).
V. John Kerr, M.P., Gaddesden Place, Hemel Hempstead, Gelding, "Forest Fireaway."
H. Carr & Co., Carluke, Gelding, "Clyde Vale King."

CLASS 81. STALLION, MARE, FILLY, or GELDING, over 14 and not exceeding 15.1 hands.—Premiums, £20, £10, and £5.

1. William S. Miller, The Moorings, Dumbreck, Glasgow, "Lord Prim."
2. James Prentice, Carolside, Uddingston, Gelding, "Earl of Home."
3. Alex. Gemmell, Ayr, Gelding, "Danegelt's Son."
V. Robert Forrest, Knockinlaw, Kilmarnock, Mare, "Knockinlaw Gem."
H. James Wilson, M.D., Redhurst, Irvine, Gelding, "Ding Dong."

CLASS 82. STALLION, MARE, FILLY, or GELDING, 14 hands and under.—Premiums, £15, £10, and £5.

1. Thos. Perkin Robertson, Pinderfields, Wakefield, Gelding, "Pinderfields Ruby."
2. Alex. Morton, Gowanbank, Darvel, Mare, "Royal Fair" (14,705).
3. Miss Marianne Anderson, Barskimming, Mauchline, Gelding, "Marconi."
V. James Buchanan, Elcho Street, nr. Graham Square, Glasgow, Mare, "Tansy" (14,771).
H. Wm. S. Miller, The Moorings, Dumbreck, Glasgow, Mare, "Goody Two Shoes."

CLASS 83. PAIR MARES, FILLIES, or GELDINGS in double Harness, over 15.1 hands.—Premiums, £20, £10, and £5.

1. John Kerr, M.P., Gaddesden Place, Hemel Hempstead, Mare, "Advertisement" (14,094), and Gelding, "Paddock Wildfire."
2. Carr & Co., Clyde Vale Stud, Carluke, Geldings, "Clyde Vale King" and "Clyde Vale Astonishment."

CLASS 84. PAIR MARES, FILLIES, or GELDINGS in double Harness, 15.1 hands and under.—Premiums, £20, £10, and £5.

1. Robert Forrest, Knockinlaw, Kilmarnock, Mare, "Knockinlaw Gem," and Gelding, "Gentleman George."
2. Alex. Gemmell, Ayr, Geldings, "Victor" and "Danegelt's Son."

CLASS 85. PAIR MARES, FILLIES, or GELDINGS driven Tandem, any height. —Premiums, £20 and £10.

1. James Prentice, Carolside, Uddingston, Geldings, "Earl of Home" and "Lord Dunglass."

VAN HORSES.

PRESIDENT'S CHAMPION MEDAL for best Van Horse.

Kinning Park Co-operative Society, Limited, 6 North Coburg Street, Glasgow, S.S., Gelding, "Climax."

CLASS 86. MARE or GELDING, 3 years old and upwards, suited for heavy van purposes, shown in trade van; to be exhibited on Thursday, 6th July, only; the winners to take part, if required, in both parades on Thursday and Friday.—Premiums, £10, £6, and £4. (£10 contributed, per Mr W. Taylor, Park Mains.)

1. Kinning Park Co-operative Society, Limited, 6 North Coburg Street, Glasgow, S.S., Gelding, "Climax."
2. Kinning Park Co-operative Society, Limited, 6 North Coburg Street, Glasgow, S.S., Gelding, "Bonus."
3. Cassels & Co., Quarry Street, Hamilton, Gelding.
V. James Walker, West Brownlee, Carluke, Gelding.
H. Scottish Co-operative Wholesale Society, Limited, 95 Morrison Street, Glasgow, Gelding, "Clarence."

JUMPING COMPETITIONS

Wednesday, 5th July.

CLASS 1. HORSES or PONIES, any height.—Premiums, £20, £15, £10, £5, and £3.

1. Simon Andrews & Sons, Cardonald Grain Mills, Paisley, Gelding, "Ping Pong."
2. F. V. Grange, Oak House, Farndon, Chester, Gelding, "Rufus."
3. Whittingham Brothers, Wellington Street, Burton-on-Trent, Mare, "Snowdrop."
4. Whittingham Brothers, Wellington Street, Burton-on-Trent, Gelding, "Starlight."
5. Wheeler & Nodwell, Studley and Dumfries, Gelding, "Confidence."

Thursday, 6th July.

CLASS 2. HORSES or PONIES, any height, Handicap, hurdles and gate being raised 8 inches for the winner of the first prize, and 4 inches for the winner of the second prize in Class 1.—Premiums, £10, £8, £5, £3, and £2.

1. W. Dawson, Stainton, Penrith, Gelding, "Irish Boy."
2. Whittingham Brothers, Burton-on-Trent, Gelding, "Starlight."
3. Wheeler & Nodwell, Studley and Dumfries, Gelding, "High Life."
4. F. V. Grange, Oak House, Farndon, Chester, Gelding, "Rufus."
5. D. Carnegie, East Pitcorthie, Colinsburgh, Gelding, "The Dodger."

Friday, 7th July.

CLASS 3. HORSES or PONIES, any height, Handicap, hurdles and gate being raised 8 inches for the winner of the first prize, and 4 inches for the winner of the second prize in either of Classes 1 or 2—4 inches extra for the winner of the two first prizes in Classes 1 and 2.—Premiums, £10, £8, £5, £3, and £2.

1. F. V. Grange, Oak House, Farndon, Chester, Gelding, "Hardcash."
2. W. Dawson, Stainton, Penrith, Gelding, "Irish Boy."
3. Whittingham Brothers, Burton-on-Trent, Mare, "Snowdrop."
4. T. & H. Ward, Pinchinthorpe, Great Ayton, Gelding.
5. James D. Innes, Calder Mains, Thurso, Gelding, "Tommy."

Champion Prize of £10 *for most points in Prizes with one or more Horses in above Classes*—First Prize to count three points; Second Prize, two points; and Third Prize, one point. The money to be evenly divided in the event of a tie.

Whittingham Brothers, Wellington Street, Burton-on-Trent.

Wednesday Evening, at 7 P.M.

HORSES or PONIES, any height.—Premiums, £10, £5, £3, and £2.

1. F. V. Grange, Oak House, Farndon, Chester, Gelding, "Rufus."
2. Whittingham Brothers, Wellington Street, Burton-on-Trent, Mare, "Snowdrop."
3. Whittingham Brothers, Wellington Street, Burton-on-Trent, Gelding, "Starlight."
4. F. V. Grange, Oak House, Farndon, Chester, Gelding, "Hardcash."

Thursday Evening, at 7 P.M.

HORSES or PONIES, any height.—Premiums, £10, £5, £3, and £2.

1. Wheeler & Nodwell, Studley and Dumfries, Gelding, "High Life."
2. F. V. Grange, Oak House, Farndon, Chester, Gelding, "Rufus."
3. F. V. Grange, Oak House, Farndon, Chester, Gelding, "Hardcash."
4. D. Carnegie, East Pitcorthie, Colinsburgh, Gelding, "The Dodger."

SHEEP

BLACKFACED.

PRESIDENT'S CHAMPION MEDAL for best Pen of Blackfaced Sheep.

James Clark, Crossflatt, Muirkirk, "Heather Bell."

Blackface Shearling Ram in Class 88 *best fitted for producing stock to yield early-maturity mutton, and carrying the fleece best adapted for protecting the animal in a high, exposed, and stormy district*—Prizes, £4, £2, and £1 (given by Mr C. Howatson of Glenbuck).

1. James Clark, Crossflatt, Muirkirk, "Heather Bell."
2. Matthew G. Hamilton, Woolfords, Cobbinshaw.
3. M. P. Fraser, Rankinston, by Ayr.

Challenge Trophy, value 100 *guineas, for a Group of Sheep, consisting of one Aged Ram, one Shearling Ram, one Ewe and Lamb, the Lamb to be the produce of the Ewe exhibited, and may be either a Tup or Ewe Lamb, and to be judged as part of the Group, and one Gimmer*—All to be bred by and the property of the exhibitor, or bred on the farm now in his possession and the property of the exhibitor, and shown in the ordinary classes; the Trophy to become the property of the exhibitor winning it three times with different sheep; Lambs, Shearling Rams, and Gimmers being eligible to compete again. A Silver Medal, commemorative of the event, will be presented to the winner on each occasion (given by the late Mr R. Sinclair Scott of Burnside).

James Clark, Crossflatt, Muirkirk.

CLASS 87. TUP, above one Shear.—Premiums, £12, £8, £4, and £2.

1. J. Archibald, Overshiels, Stow.
2. James Clark, Crossflatt, Muirkirk, "Crossflatt Net."
3. A. and D. M'Dougall, Claggan, Killin.
4. Matthew G. Hamilton, Woolfords, Cobbinshaw.

V. Cadzow Brothers, Borland, Carstairs Junction, and Stonehill, Abington.
H. J. Archibald, Overshiels, Stow.
C. Charles Howatson of Glenbuck.

CLASS 88. SHEARLING TUP.—Premiums, £12, £8, £4, and £2.

1. James Clark, Crossflatt, Muirkirk, "Heather Bell."
2. Matthew G. Hamilton, Woolfords, Cobbinshaw.
3. M. P. Fraser, Rankinston, by Ayr.
4. Matthew G. Hamilton, Woolfords, Cobbinshaw.

V. Cadzow Brothers, Borland, Carstairs Junction, and Stonehill, Abington.
H. James Hamilton, Nether Wellwood, Muirkirk.
C. J. Archibald, Overshiels, Stow.

CLASS 89. EWE, above one Shear, with her Lamb at foot.—
Premiums, £10, £5, and £2.

1. John Millar, Lambhill, Strathaven, "Queen of Scots."
2. John Millar, Lambhill, Strathaven.
3. Cadzow Brothers, Borland, Carstairs Junction, and Stonehill, Abington.

V. James Clark, Crossflatt, Muirkirk.
H. Cadzow Brothers, Borland, Carstairs Junction, and Stonehill, Abington.
C. James Clark, Crossflatt, Muirkirk.

CLASS 90. SHEARLING EWE or GIMMER.—Premiums, £10, £5, and £2.

1. Charles Howatson of Glenbuck.
2. James Clark, Crossflatt, Muirkirk.
3. A. & D. M'Dougall, Claggan, Killin.

V. John Millar, Lambhill, Strathaven.
H. James Clark, Crossflatt, Muirkirk.
C. Robert Lees, Lagg, Ayr.

CLASS 91. RAM LAMB, drawn from Class 89, or entered here along with dam (the dam, which may be clipped or unclipped, will not be judged).—Prizes, £4, £2, and £1 (given by Mr C. Howatson of Glenbuck).

1. Charles Howatson of Glenbuck (Twin).
2. John Robson, Newton, Bellingham.
3. Robert Lees, Lagg, Ayr.

V. Cadzow Brothers, Borland, Carstairs Junction, and Stonehill, Abington.
H. Matthew G. Hamilton, Woolfords, Cobbinshaw.
C. Charles Howatson of Glenbuck (Twin).

CHEVIOT.

PRESIDENT'S CHAMPION MEDAL for best Pen of Cheviot Sheep.

John Robson, Newton, Bellingham, "Kuroki."

Challenge Cup, value £25, for best Sheep in the Cheviot Classes—Given by the Cheviot Sheep Society.

John Robson, Newton, Bellingham, "Kuroki."

CLASS 92. TUP, above one Shear.—Premiums, £12, £8, £4, and £2.

1. John Robson, Newton, Bellingham, "Kuroki."
2. James Moffat, Craick, Hawick, "Goldfinder."
3. John Robson, Newton, Bellingham, "Marshal Oyama."
4. Jacob Robson, Byrness, Otterburn, Northumberland.

V. Jacob Robson, Byrness, Otterburn, Northumberland, "Prince Charming."
H. John Elliot, Hindhope, Jedburgh.
C. John Elliot, Hindhope, Jedburgh.

CLASS 93. SHEARLING TUP.—Premiums, £12, £8, £4, and £2.

1. John Elliot, Hindhope, Jedburgh.
2. John Murray, Parkhall, Douglas.
3. John Murray, Parkhall, Douglas.
4. J. R. C. Smith, Mowhaugh, Yetholm.
V. Jacob Robson, Byrness, Otterburn, Northumberland.
H. J. R. C. Smith, Mowhaugh, Yetholm.
C. John Elliot, Hindhope, Jedburgh.

CLASS 94. EWE, above one Shear, with her Lamb at foot.—Premiums, £10, £5, and £2.

1. John Robson, Newton, Bellingham.
2. Jacob Robson, Byrness, Otterburn, Northumberland.
3. Jacob Robson, Byrness, Otterburn, Northumberland.
V. John Elliot, Hindhope, Jedburgh.
V. Jacob Robson, Byrness, Otterburn, Northumberland.
V. A. & Jas. K. Smith, Leaston, Upper Keith.

CLASS 95. SHEARLING EWE or GIMMER.—Premiums, £10, £5, and £2.

1. James Moffatt, Craick, Hawick.
2. J. R. C. Smith, Mowhaugh, Yetholm.
3. Jacob Robson, Byrness, Otterburn, Northumberland.
V. A. & Jas. K. Smith, Leaston, Upper Keith.
H. John Elliot, Hindhope, Jedburgh.
C. John Elliot, Hindhope, Jedburgh.

BORDER LEICESTER.

PRESIDENT'S CHAMPION MEDAL for best Pen of Border Leicesters.

David Hume, Barrelwell, Brechin. (No. 907.)

Prize of £10 *for best Pen of Border Leicester Sheep, drawn from the Ordinary Classes, registered or eligible for registration in the Border Leicester Flock-Book*—Given by the Society of Border Leicester Sheep-Breeders.

David Hume, Barrelwell, Brechin. (No. 907.)

CLASS 96. TUP, above one Shear.—Premiums, £12, £8, £4, and £2.

1. W. S. Ferguson, Pictstonhill, Perth.
2. Robert Taylor, Pitlivie Farm, Carnoustie, "Pitlivie Rover."
3. William Scott, Thornhome, Carluke, "Leaston Chief" (1078).
4. T. M'Intosh, Knowhead, Brechin.
V. W. C. Moyes, Cairndrum, Brechin.
H. D. Y. Stewart, Balgrochan, Torrance, "Bardrill Prince" (1368).

CLASS 97. SHEARLING TUP.—Premiums, £12, £8, £4, and £2.

1. David Hume, Barrelwell, Brechin.
2. Thomas Clark, Oldhamstocks Mains, Cockburnspath.
3. David Hume, Barrelwell, Brechin.
4. David Hume, Barrelwell, Brechin.
V. The Right Hon. A. J. Balfour, Whittingehame, Prestonkirk.
H. The Duke of Buccleuch and Queensberry, K.G., K.T., Dalkeith Park, Dalkeith.
C. William Scott, Thornhome, Carluke, N.B., "Thornhome Prince" (1519).

CLASS 98. EWE, above one Shear.—Premiums, £10, £5, and £2.

1. The Right Hon. A. J. Balfour, Whittingehame, Prestonkirk.
2. J. & J. R. C. Smith, Galalaw, Kelso.
3. The Duke of Buccleuch and Queensberry, K.G., K.T., Dalkeith Park, Dalkeith.
V. David Hume, Barrelwell, Brechin.
H. The Right Hon. A. J Balfour, Whittingehame, Prestonkirk.
C. W. C. Moyes, Cairndrum, Brechin.

CLASS 99. SHEARLING EWE or GIMMER.—Premiums, £10, £5, and £2.

1. David Hume, Barrelwell, Brechin.
2. W. S. Ferguson, Pictstonhill, Perth.
3. The Right Hon. A. J. Balfour, Whittingehame, Prestonkirk.
V. J. & J. R. C. Smith, Galalaw, Kelso.
H. T. M'Intosh, Knowhead, Brechin.
C. David Hume, Barrelwell, Brechin.

HALF-BRED.

PRESIDENT'S CHAMPION MEDAL for best Pen of Half-Breds.

John Bertram, Addinston, Lauder. (No. 969.)

CLASS 100. TUP, above one Shear.—Premiums, £12, £8, £4, and £2.

1. John Bertram, Addinston, Lauder.
2. James A. W. Mein, Hunthill, Jedburgh.

CLASS 101. SHEARLING TUP.—Premiums, £12, £8, £4, and £2.

1. John Bertram, Addinston, Lauder.
2. John Bertram, Addinston, Lauder.
3. John Bertram, Addinston, Lauder.
4. Robert Dickinson, Longcroft, Oxton, Berwickshire.
V. Robert Dickinson, Longcroft, Oxton, Berwickshire.
H. A. & Jas. K. Smith, Leaston, Upper Keith.
C. Robert Dickinson, Longcroft, Oxton, Berwickshire.

CLASS 102. EWE, above one Shear.—Premiums, £10, £5, and £2.

1. James A. W. Mein, Hunthill, Jedburgh.
2. A. & Jas. K. Smith, Leaston, Upper Keith.
3. Alexander Brown, Incharvie, Kilconquhar, Fife.
V. Alexander Brown, Incharvie, Kilconquhar, Fife.
C. James A. W. Mein, Hunthill, Jedburgh.

CLASS 103. SHEARLING EWE or GIMMER.—Premiums, £10, £5, and £2.

1. James A. W. Mein, Hunthill, Jedburgh.
2. James A. W. Mein, Hunthill, Jedburgh.
3. A. & Jas. K. Smith, Leaston, Upper Keith.
V. Robert Dickinson, Longcroft, Oxton, Berwickshire.

SHROPSHIRE.

PRESIDENT'S CHAMPION MEDAL for best Pen of Shropshires.

R. P. Cooper, Shenstone Court, Lichfield. (No. 986.)

CLASS 104. TUP, above one Shear.—Premiums, £6, £4, and £2.

1. R. P. Cooper, Shenstone Court, Lichfield.
2. George Russell, Hatton, Lundin Links, "Corston Royal Blood" (11,718).
3. Thomas A. Buttar, Corston, Coupar-Angus.

CLASS 105. SHEARLING TUP.—Premiums, £6, £4, and £2.

1. R. P. Cooper, Shenstone Court, Lichfield.
2. Thomas A. Buttar, Corston, Coupar-Angus.
3. Thomas A. Buttar, Corston, Coupar-Angus.
V. Thomas A. Buttar, Corston, Coupar-Angus.
H. John C. Gow, Bally Stokes, Downpatrick, Co. Down, Ireland, "Erin-go-Braugh."
C. Thomas A. Buttar, Corston, Coupar-Angus.
C. John C. Gow, Bally Stokes, Downpatrick, Co. Down, Ireland.

CLASS 106. EWE, above one Shear.—Premiums, £5, £3, and £2.

1. R. P. Cooper, Shenstone Court, Lichfield.
2. Thomas A. Buttar, Corston, Coupar-Angus.
3. R. P. Cooper, Shenstone Court, Lichfield.
V. Thomas A. Buttar, Corston, Coupar-Angus.

CLASS 107. SHEARLING EWE or GIMMER.—Premiums, £5, £3, and £2.

1. R. P. Cooper, Shenstone Court, Lichfield.
2. R. P. Cooper, Shenstone Court, Lichfield.
3. Thomas A. Buttar, Corston, Coupar-Angus.
V. Thomas A. Buttar, Corston, Coupar-Angus.

OXFORD DOWNS.

PRESIDENT'S CHAMPION MEDAL for best Pen of Oxford Downs.

James T. Hobbs, Maisey Hampton, Fairford, Gloucester. (No. 1016.)

CLASS 108. SHEARLING TUP.—Premiums, £6, £4, and £2.

1. James T. Hobbs, Maisey Hampton, Fairford, Gloucester.
2. James T. Hobbs, Maisey Hampton, Fairford, Gloucester.
3. James T. Hobbs, Maisey Hampton, Fairford, Gloucester.
V. Andrew S. Elliot, Hollybush, Galashiels.
H. James Fleming, Redkirk, Rigg, S.O., Carlisle, "Border Chief."
C. The Right Hon. A. J. Balfour, Whittingehame, Prestonkirk.

CLASS 109. SHEARLING EWE or GIMMER.—Premiums, £5, £3, and £2.

1. James T. Hobbs, Maisey Hampton, Fairford, Gloucester.
2. James T. Hobbs, Maisey Hampton, Fairford, Gloucester.
3. James T. Hobbs, Maisey Hampton, Fairford, Gloucester.
V. Andrew S. Elliot, Hollybush, Galashiels.
H. Andrew S. Elliot, Hollybush, Galashiels.
C. The Right Hon. A. J. Balfour, Whittingehame, Prestonkirk.

SUFFOLK.

PRESIDENT'S CHAMPION MEDAL for best Pen of Suffolk Sheep.

Alex. Anderson, Berryhill, Dundee. (No. 1027.)

CLASS 110. SHEARLING TUP.—Premiums, £6, £4, and £2.

No Entry.

Best Suffolk Ewe in Class 111 *bred in Scotland*—£3; *second best ditto*, £2.
Given by the Suffolk Sheep Society.

1. William Ford, Fentonbarns, Drem.
2. William Ford, Fentonbarns, Drem.
H. William Kennedy, Luce Mains, Ecclefechan.

CLASS 111. SHEARLING EWE or GIMMER.—Premiums, £5, £3, and £2.

1. Alex. Anderson, Berryhill, Dundee.
2. Alex. Anderson, Berryhill, Dundee.
3. William Ford, Fentonbarns, Drem.
V. Alex. Anderson, Berryhill, Dundee.
C. William Ford, Fentonbarns, Drem.

Best Pen of Suffolk Ewe Lambs in Class 112 *bred in Scotland*—£3; *second best ditto*, £2. Given by the Suffolk Sheep Society.

1. William Ford, Fentonbarns, Drem.
2. Alex. Anderson, Berryhill, Dundee.
H. William Kennedy, Luce Mains, Ecclefechan.

CLASS 112. THREE EWE LAMBS, uncoloured and untrimmed, except as to the squaring of the tail.—Premiums, £5, £3, and £2, given by the Suffolk Sheep Society.

1. Alex. Anderson, Berryhill, Dundee.
2. William Ford, Fentonbarns, Drem.
3. Alex. Anderson, Berryhill, Dundee.
H. William Kennedy, Luce Mains, Ecclefechan.

FAT SHEEP.

Best Pen of Lambs in Class 113 *got by a Suffolk Tup, and out of Cheviot or Black-faced Ewes.*—Prize of £5, given by the Suffolk Sheep Society.

William Kennedy, Luce Mains, Ecclefechan (Suffolk Tup and Cheviot or Black-faced Ewes).

Best Pen of Lambs in Class 113 *got by a Suffolk Tup, and out of Border Leicester, Half-bred, or Three-parts-bred Ewes.*—Prize of £5, given by the Suffolk Sheep Society.

Alex. Anderson, Berryhill, Dundee (Suffolk Ram and Border Leicester Ewes).

Best Pens of Cross-bred Lambs in Class 113 *got by an Oxford Down Tup.*—Prizes of £5, £3, and £2, given by Oxford Down Sheep-Breeders' Association.

1. Alex. Anderson, Berryhill, Dundee (Oxford Down Ram and Hampshire Down Ewes).
2. Alexander Brown, Incharvie, Kilconquhar (Oxford Down Tup and Half-bred Ewes).
3. Right Hon. A. J. Balfour, Whittingehame, Prestonkirk (Oxford Down Ram and Half-bred Ewes).

CLASS 113. Five FAT LAMBS, any Breed or Cross, dropped in the year of the Show.—Premiums, £5 and £3.

1. Alex. Anderson, Berryhill, Dundee (Oxford Down Ram and Hampshire Down Ewes).
2. Alexander Brown, Incharvie, Kilconquhar (Oxford Down Tup and Half-bred Ewes).
V. Alex. Anderson, Berryhill, Dundee (Suffolk Ram and Border Leicester Ewes).

EXTRA STOCK.

(CROSS HOGGS.)

The following was Very Highly Commended, and a Medium Silver Medal awarded.

W. Marshall, Glenwhommie, Dunblane (Border Leicester Ram out of Blackfaced Ewe).

The following was Highly Commended, and a Bronze Medal awarded.

W. Marshall, Glenwhommie, Dunblane (Border Leicester Ram out of Blackfaced Ewe).

SWINE

PRESIDENT'S CHAMPION MEDAL for best Pen of Swine.

William B. Wallace, Broomhouse, Corstorphine, Mid-Lothian, "Broomhouse Laddie (7279).

LARGE WHITE BREED.

CLASS 114. BOAR.—Premiums, £6, £4, and £2.

1. William B. Wallace, Broomhouse, Corstorphine, Mid-Lothian, "Broomhouse Laddie" (7279).
2. R. R. Rothwell, Fulwood Hall Farm, Preston, "Fulwood Duke" (8569).
3. The Earl of Ellesmere, Worsley Hall, Manchester, "Worsley Duke IV."

C. Sanders Spencer & Son, Holywell Manor, St Ives, Hunts, "Holywell Czech."

CLASS 115. SOW.—Premiums, £6, £4, and £2.

1. Sir Gilbert Greenall, Bart., Walton Hall, Warrington, "Lindsey A" (14,186).
2. D. W. Gunn, Craigcrook Farm, Blackhall, near Edinburgh, "Worsley Perfection IV." (14,912).
3. The Earl of Ellesmere, Worsley Hall, Manchester, "Worsley Sunbeam I." (14,932).

C. D. W. Gunn, Craigcrook Farm, Blackhall, near Edinburgh, "Walton Beauty" (13,038).

CLASS 116. Three PIGS, not above 8 months old.—Premiums, £5, £3, and £2.

1. R. R. Rothwell, Fulwood Hall Farm, Preston.
2. The Earl of Ellesmere, Worsley Hall, Manchester.
3. A. E. Todd, Stoneybank, Musselburgh.

C. William B. Wallace, Broomhouse, Corstorphine, Mid-Lothian.

WHITE BREED OTHER THAN LARGE.

CLASS 117. BOAR.—Premiums, £6, £4, and £2.

1. Sir Gilbert Greenall, Bart., Walton Hall, Warrington, "Walton Dainty III." (8201).
2. Sir Gilbert Greenall, Bart., Walton Hall, Warrington, "Walton Turret VII." (8229).
3. Sanders Spencer & Son, Holywell Manor, St Ives, Hunts, "Holywell Rosario."

C. Sir Gilbert Greenall, Bart., Walton Hall, Warrington, "Offley John" (7395).

CLASS 118. SOW.—Premiums, £6, £4, and £2.

1. Sir Gilbert Greenall, Bart., Walton Hall, Warrington, "Walton Jewel II." (15,126).
2. Sir Gilbert Greenall, Bart., Walton Hall, Warrington, "Walton Rose XIV." (12,002).
3. Sanders Spencer & Son, Holywell Manor, St Ives, Hunts, "Holywell Carlisle Victoria."

EXTRA STOCK.

The following was Very Highly Commended, and a Medium Silver Medal awarded.

Leopold C. Paget, Harewood, Leeds, Middle White Sow, "Holywell Barbara" (16,320).

CLASS 119. Three PIGS, not above 8 months old.—Premiums, £5, £3, and £2.

1. Sanders Spencer & Son, Holywell Manor, St Ives, Hunts.
2. Sir Gilbert Greenall, Bart., Walton Hall, Warrington.
3. Sanders Spencer & Son, Holywell Manor, St Ives, Hunts.

BERKSHIRE.

CLASS 120. BOAR.—Premiums, £6, £4, and £2.

1. The Duchess of Devonshire, Compton Place, Eastbourne, Sussex, "Polegate Dollar" (9809).
2. The Duchess of Devonshire, Compton Place, Eastbourne, Sussex, "Polegate Decimal" (9814).
3. William Ewing Gilmour, Woodbank, Alexandria, Dumbartonshire, "Direct Augustus II."

CLASS 121. SOW.—Premiums, £6, £4, and £2.

1. The Duchess of Devonshire, Compton Place, Eastbourne, Sussex, "Polegate Dahlia."
2. The Duchess of Devonshire, Compton Place, Eastbourne, Sussex, "Polegate Dido" (9806).
3. J. Jefferson, Peel Hall, Chester, "Peel Model."
H. J. Jefferson, Peel Hall, Chester.
C. William Ewing Gilmour, Woodbank, Alexandria, Dumbartonshire.
C. William Ewing Gilmour, Woodbank, Alexandria, Dumbartonshire.

CLASS 122. Three PIGS, not above 8 months old.—Premiums, £5, £3, and £2.

1. The Duchess of Devonshire, Compton Place, Eastbourne, Sussex.
2. The Duchess of Devonshire, Compton Place, Eastbourne, Sussex.
3. William Ewing Gilmour, Woodbank, Alexandria, Dumbartonshire.
C. William Ewing Gilmour, Woodbank, Alexandria, Dumbartonshire.

POULTRY

First Premium—*One Sovereign.* Second Premium—*Ten Shillings.* Where there are Six or more Entries, Third Premium—*Five Shillings.*

CHAMPION MEDALS.

1. *Best Cock, any variety.*

Richardson Bros., Muir, Bannockburn (Silver Grey Dorking Cock).

2. *Best Hen, any variety.*

George H. Procter, Flass House, Durham (Cochin China Hen).

3. *Best Cockerel, any variety.*

Charles Aitkenhead, Stud Farm, Seaham Harbour (Silver Grey Dorking Cockerel).

4. *Best Pullet, any variety.*

J. M. Philipson, Fell House, Haydon Bridge, Northumberland (Silver Wyandotte Pullet).

5. *Best Pen of Ducks.*

The Countess of Home, The Hirsel, Coldstream (Aylesbury Drake).

6. *Best Pen of Geese.*

W. Woods, Worksop (Toulouse Gander).

7. *Best Pen of Turkeys.*

Miss Shanks, Cuthelton Farm, Denny (Bronze Cock).

CLASS 1. DORKING—Coloured. Cock.

1. R. S. Hunter, Fifeshire Poultry Farm, Ladybank.
2. C. Sneddon, Kirkham, Lancashire.
3. Charles Aitkenhead, Stud Farm, Seaham Harbour.
V. J. T. Cathcart, Pitcairlie, Newburgh, Fife.
H. Charles Aitkenhead, Stud Farm, Seaham Harbour.
C. Claude Hamilton, The Heneries, Sundrum, Ayr.

CLASS 2. DORKING—Coloured. Hen.

1. The Countess of Home, The Hirsel, Coldstream.
2. Miss Shanks, Cuthelton Farm, Denny.
3. W. Marshall, Glenwhommie, Dunblane.
V. George Anderson, Bankside, Newbigging, Newtyle.
H. C. Sneddon, Kirkham, Lancashire.

CLASS 3. DORKING—Coloured. Cockerel.

1. Charles Aitkenhead, Stud Farm, Seaham Harbour.
2. C. Sneddon, Kirkham, Lancashire.
3. The Countess of Home, The Hirsel, Coldstream.
V. Robert Jackson, Dawdon Hill Farm, Seaham Harbour.

CLASS 4. DORKING—Coloured. Pullet.

1. Charles Aitkenhead, Stud Farm, Seaham Harbour.
2. Charles Aitkenhead, Stud Farm, Seaham Harbour.
3. C. Sneddon, Kirkham, Lancashire.
V. A. K. Crichton, Estates Office, Bridge of Weir.
H. Robert Jackson, Dawdon Hill Farm, Seaham Harbour.

CLASS 5. DORKING—Silver Grey. Cock.

1. Richardson Bros., Muir, Bannockburn.
2. W. B. Dickinson, Longcroft, Oxton, Berwickshire.
3. The Countess of Home, The Hirsel, Coldstream.
V. George M'Bain, Linkwood, Elgin.
H. C. Sneddon, Kirkham, Lancashire.
C. R. S. Hunter, Fifeshire Poultry Farm, Ladybank.
C. Alex. Cross of Knockdon, Maybole.

CLASS 6. DORKING—Silver Grey. Hen.

1. C. Sneddon, Kirkham, Lancashire.
2. J. Mechie, jun., Miller, Auchtermuchty, Fife.
3. W. B. Dickinson, Longcroft, Oxton, Berwickshire.
V. George M'Bain, Linkwood, Elgin.
H. The Countess of Home, The Hirsel, Coldstream.

CLASS 7. DORKING—Silver Grey. Cockerel.

1. Charles Aitkenhead, Stud Farm, Seaham Harbour.
2. Malcolm S. Speir, Culdees Castle, Muthill.
3. Alex. Cross of Knockdon, Maybole.
V. C. Sneddon, Kirkham, Lancashire.
H. A. K. Crichton, Estates Office, Bridge of Weir.

CLASS 8. DORKING—Silver Grey. Pullet.

1. Malcolm S. Speir, Culdees Castle, Muthill.
2. Charles Aitkenhead, Stud Farm, Seaham Harbour.
3. Alex. Cross of Knockdon, Maybole.
V. C. Sneddon, Kirkham, Lancashire.

CLASS 9. COCHIN-CHINA. Cock.

1. George H. Procter, Flass House, Durham.
2. George H. Procter, Flass House, Durham.
3. Mrs Hendrie, 324 St George's Road, Glasgow.
V. John Ferguson, 7 North Inglis Street, Dunfermline.
H. John Ferguson, 7 North Inglis Street, Dunfermline.
C. Mrs Hendrie, 324 St George's Road, Glasgow.

CLASS 10. COCHIN-CHINA. Hen.

1. George H. Procter, Flass House, Durham.
2. George H. Procter, Flass House, Durham.
3. A. K. Crichton, Estates Office, Bridge of Weir.
V. George Archibald, Blebo Craigs, by Cupar-Fife.
H. Thomas Gardner, Wraes Mill, Neilston.
C. John Ferguson, 7 North Inglis Street, Dunfermline.

CLASS 11. BRAHMAPOOTRA. Cock.

1. George Archibald, Blebo Craigs, by Cupar-Fife.
2. Lady Gordon Cumming, Altyre House, Forres.
H. R. S. Hunter, Fifeshire Poultry Farm, Ladybank.

CLASS 12. BRAHMAPOOTRA. Hen.

1. The Countess of Home, The Hirsel, Coldstream.
2. R. S. Hunter, Fifeshire Poultry Farm, Ladybank.
V. George Archibald, Blebo Craigs, by Cupar-Fife.
H. A. Wilson, 28 Argyle Street, Paisley.

CLASS 13. BRAHMA or COCHIN. Cockerel.

1. A. K. Crichton, Estates Office, Bridge of Weir (Cochin).
2. John Ferguson, 7 North Inglis Street, Dunfermline (Cochin).

CLASS 14. BRAHMA or COCHIN. Pullet.

1. Lady Gordon Cumming, Altyre House, Forres (Brahma).
2. A. K. Crichton, Estates Office, Bridge of Weir (Cochin).
H. John Ferguson, 7 North Inglis Street, Dunfermline.

CLASS 15. SCOTCH GREY. Cock.

1. Alex. Ollar, Kilkerran Cottage, Campbeltown.
2. John Carswell, 148 Graham's Road, Falkirk.
3. John Carswell, 148 Graham's Road, Falkirk.
V. Matthew Smith, Townhead Farm, Thornhill.
H. David Hastings, Glaister Cottage, Darvel, Ayrshire.

CLASS 16. SCOTCH GREY. Hen.

1. David Hastings, Glaister Cottage, Darvel, Ayrshire.
2. William Morgan, Balcurvie, Windygates, Fife.
V. John Cunningham, Mill Bank, Dreghorn, Ayrshire.
H. George S. Robertson, Thornyhall Farm, Douglas, Lanarkshire.

CLASS 17. SCOTCH GREY. Cockerel.

1. John Carswell, 148 Graham's Road, Falkirk.
2. John Carswell, 148 Graham's Road, Falkirk.
3. John Robertson, Schawpark, Alloa.
V. A. Beardsley, Cardonald, near Glasgow.
H. James Ross, Broomhill, Darvel.

CLASS 18. SCOTCH GREY. Pullet.

1. A. Beardsley, Cardonald, near Glasgow.
2. John Carswell, 148 Graham's Road, Falkirk.
3. James Grainger, 161 Grahamston, Falkirk.
V. David Hastings, Glaistor Cottage, Darvel, Ayrshire.
H. John Carswell, 148 Graham's Road, Falkirk.
C. John Robertson, Schawpark, Alloa.

CLASS 19. HAMBURG—Black. Cock.

1. Henry Pickles, Kayfield House, Earby.
2. Henry Pickles, Kayfield House, Earby.
V. Seton M. Thomson, Preston House, Linlithgow.

CLASS 20. HAMBURG—Black. Hen.

1. Henry Pickles, Kayfield House, Earby.
2. Seton M. Thomson, Preston House, Linlithgow.

CLASS 21. HAMBURG—Any other Variety. Cock.

1. Henry Pickles, Kayfield House, Earby (Silver-spangled).
2. Henry Pickles, Kayfield House, Earby (Silver-pencilled).
3. Weir Brothers, New Abbey Road, Dumfries (Gold-pencilled).
V. Thomas Wilson, 77 New Road, Ayr (Gold-spangled).
H. Malcolm M'Kinnon, East King Street, Paisley (Silver-pencilled).

CLASS 22. HAMBURG—Any other Variety. Hen.

1. Henry Pickles, Kayfield House, Earby (Silver-spangled).
2. David K. Livingstone, Bridge of Earn (Gold-pencilled).
V. Malcolm M'Kinnon, East King Street, Paisley (Silver-pencilled).

CLASS 23. HAMBURG—Any Variety. Cockerel.

1. Henry Pickles, Kayfield House, Earby (Silver-pencilled).
2. David K. Livingstone, Bridge of Earn (Gold-pencilled).
H. Henry Pickles, Kayfield House, Earby (Silver-spangled).

CLASS 24. HAMBURG—Any Variety. Pullet.

1. Henry Pickles, Kayfield House, Earby (Silver-spangled).
2. David K. Livingstone, Bridge of Earn (Gold-pencilled).

CLASS 25. PLYMOUTH ROCK. Cock.

1. R. S. Hunter, Fifeshire Poultry Farm, Ladybank.
2. Alex. Watt, 331 Great Western Road, Aberdeen.
V. Alex. Watt, 331 Great Western Road, Aberdeen.
H. William Shanks, Cuthelton Farm, Denny.

CLASS 26. PLYMOUTH ROCK. Hen.

1. Alex. Watt, 331 Great Western Road, Aberdeen.
2. W. B. Dickinson, Longcroft, Oxton, Berwickshire.
3. Alex. M. Prain, Rawes, Longforgan.
V. R. S. Hunter, Fifeshire Poultry Farm, Ladybank.
H. William Walker, 21 Clark Street, Airdrie.
C. Alex. Watt, 331 Great Western Road, Aberdeen.

CLASS 27. PLYMOUTH ROCK. Cockerel.

1. Lady Gordon Cumming, Altyre House, Forres.
2. Mrs Gillespie, Wyndhead, Lauder.
V. Mrs Gillespie, Wyndhead, Lauder.

CLASS 28. PLYMOUTH ROCK. Pullet.

1. Mrs Gillespie, Wyndhead, Lauder.
2. Henry Thompson, 28 Woodlands Terrace, Darlington.

CLASS 29. MINORCA. Cock.

1. Thomas Gardner, Wraes Mill, Neilston.
2. Robert Webster, 3 High Barholm, Kilbarchan.
3. Robert Mitchell, Fowler Farm, Mauchline.
V. Alex. M. Prain, Rawes, Longforgan.

CLASS 30. MINORCA. Hen.

1. Weir Brothers, New Abbey Road, Dumfries.
2. Alex. M. Prain, Rawes, Longforgan.
3. James Scott, Forthill Cottages, Broughty-Ferry.
V. Lady Gordon Cumming, Altyre House, Forres.
H. James Howieson, Firdale, Causewayend, by Linlithgow.

CLASS 31. MINORCA. Cockerel.

1. Robert Mitchell, Fowler Farm, Mauchline.
2. Lady Gordon Cumming, Altyre House, Forres.
H. Weir Brothers, New Abbey Road, Dumfries.

CLASS 32. MINORCA. Pullet.

1. Alex. M. Prain, Rawes, Longforgan.
2. The Countess of Home, The Hirsel, Coldstream.

CLASS 33. LEGHORN—White. Cock.

1. Weir Brothers, New Abbey Road, Dumfries.
2. Moir Robertson, Cairney Hill, Dunfermline.
3. Weir Brothers, New Abbey Road, Dumfries.
H. John King, Rodenbain, Hollybush.

CLASS 34. LEGHORN—White. Hen.

1. Weir Brothers, New Abbey Road, Dumfries.
2. Weir Brothers, New Abbey Road, Dumfries.
3. Moir Robertson, Cairney Hill, Dunfermline.
H. Alex. M. Prain, Rawes, Longforgan.
C. David Blair, Mauldslie, Carluke.

CLASS 35. LEGHORN—Any other Variety. Cock.

No Award.

CLASS 36. LEGHORN—Any other Variety. Hen.

1. Andrew Carnduff, Draper, Barrhead (Brown).
2. William Keys, Kintore, Aberdeenshire (Brown).

CLASS 37. LEGHORN—Any Variety. Cockerel.

1. Weir Brothers, New Abbey Road, Dumfries (White).
2. Weir Brothers, New Abbey Road, Dumfries (White).
3. Robert Durward, Shoemaker, Dunecht (Brown).

CLASS 38. LEGHORN. Any Variety. Pullet.

1. Alex. M. Prain, Rawes, Longforgan (White).
2. Weir Brothers, New Abbey Road, Dumfries (White).
3. Robert Durward, Shoemaker, Dunecht (Brown).

CLASS 39. LANGSHAN. Cock.

1. Claude Hamilton, The Heneries, Sundrum, Ayr.
2. Richardson Brothers, Muir, Bannockburn.
3. J. & D. Alexander, Netherbeath, Crossgates, Fife.
V. W. Marshall, Glenwhommie, Dunblane.
H. Andrew Stillie, Heatherlie, Selkirk.
C. D. Stevenson, Sauchenbush Farm, Kirkcaldy.

CLASS 40. LANGSHAN. Hen.

1. J. & D. Alexander, Netherbeath, Crossgates, Fife.
2. D. Stevenson, Sauchenbush, Kirkcaldy.
3. T. Haxton & Sons, Westmuir, Blackford.
V. Claude Hamilton, The Heneries, Sundrum, Ayr.
H. Richardson Brothers, Muir, Bannockburn.
C. Andrew Stillie, Heatherlie, Selkirk.

CLASS 41. LANGSHAN. Cockerel.

1. Richardson Brothers, Muir, Bannockburn.
2. J. & D. Alexander, Netherbeath, Crossgates, Fife.

CLASS 42. LANGSHAN. Pullet.

1. J. & D. Alexander, Netherbeath, Crossgates, Fife.
2. T. Haxton & Sons, Westmuir, Blackford.

CLASS 43. ORPINGTON—Black. Cock.

1. Robert Paterson, Main Street, Busby.
2. W. Cook & Sons, Orpington House, St Mary Cray, Kent.
3. Mrs Gillespie, Wyndhead, Lauder.
V. George Cooper, Woodlea, Dyce, Aberdeenshire.
H. A. & R. Mills, Wester Dalqueich, by Kinross.

CLASS 44. ORPINGTON—Black. Hen.

1. R. S. Hunter, Fifeshire Poultry Farm, Ladybank.
2. Ralph D. Moore, Leabank, Bearsden.
3. Robert Paterson, Main Street, Busby.

CLASS 45. ORPINGTON—Buff. Cock.

1. Alexander Reith, Eddlewood, Ayr.
2. William Morgan, Balcurvie, Windygates, Fife.
3. Claude Hamilton, The Heneries, Sundrum, Ayr.
H. W. Cook & Sons, Orpington House, St Mary Cray Kent.
C. The Countess of Home, The Hirsel, Coldstream.
C. David Reid, Bay View, Portgordon.

CLASS 46. ORPINGTON—Buff. Hen.

1. John C. Shaw, Gertrude Place, Barrhead.
2. George H. Procter, Flass House, Durham.
3. William Morgan, Balcurvie, Windygates, Fife.
C. Alexander Reith, Eddlewood, Ayr.
C. George Cooper, Woodlea, Dyce, Aberdeenshire.

CLASS 47. ORPINGTON—Any Variety. Cockerel.

1. C. Sneddon, Kirkham, Lancashire (Black).
2. Archibald Taylor, Edinburgh Cottage, Braeside, Liberton (Buff).
3. John M'Kenzie, Shoemaker, Buckie, Banffshire (Black).
H. James Fyfe, Golfhill House, Dennistoun, Glasgow (Black).
C. The Scottish Poultry and Game Rearing Co., Ltd., Brumley, Burghmuir, Perth, N.B. (Buff).

CLASS 48. ORPINGTON—Any Variety. Pullet.

1. C. Sneddon, Kirkham, Lancashire (Black).
2. Archibald Taylor, Edinburgh Cottage, Braeside, Liberton (Buff).
3. Archibald Taylor, Edinburgh Cottage, Braeside, Liberton (Buff).
V. The Scottish Poultry and Game Rearing Co., Ltd., Brumley, Burghmuir, Perth, N.B. (White).
H. David Reid, Bay View, Portgordon (Buff).

Class 49. WYANDOTTE—Gold. Cock.

1. William Morgan, Balcurvie, Windygates, Fife.
2. Henry Pickles, Kayfield House, Earby.
H. Thomas Fullarton, Loans, Troon, Ayrshire.

Class 50. WYANDOTTE—Gold. Hen.

1. Henry Pickles, Kayfield House, Earby.
2. Thomas Fullarton, Loans, Troon, Ayrshire.

Class 51. WYANDOTTE—Silver. Cock.

1. Weir Brothers, New Abbey Road, Dumfries.
2. Henry Pickles, Kayfield House, Earby.
H. John Love, Armadale Station, Armadale, Linlithgowshire.
C. Henry Maidment, Hayton Gate, Low Row Carlisle.

Class 52. WYANDOTTE—Silver. Hen.

1. William Morgan, Balcurvie, Windygates, Fife.
2. Henry Pickles, Kayfield House, Earby.
H. Fred. Argo, Market Place, Inverurie.

Class 53. WYANDOTTE—Any Variety. Cockerel.

1. Henry Pickles, Kayfield House, Earby (Gold).
2. John Wharton, Honeycott Farm, Hawes, Yorkshire (Partridge).
3. C. Sneddon, Kirkham, Lancashire (Gold).
V. William Morgan, Balcurvie, Windygates, Fife (Gold).
V. J. M. Philipson, Fell House, Haydon Bridge, Northumberland (Silver).
H. John Simpson, Leather Merchant, Buckie (Silver).
C. J. & A. Muir, Rispain, Whithorn, Wigtownshire (Gold).
C. Weir Brothers, New Abbey Road, Dumfries (Gold).

Class 54. WYANDOTTE—Any Variety. Pullet.

1. J. M. Philipson, Fell House, Haydon Bridge, Northumberland (Silver).
2. John Wharton, Honeycott Farm, Hawes, Yorkshire (Partridge).
3. Fred. Argo, Market Place, Inverurie (Silver).
V. James Glen, 5 W. Breast, Greenock (Partridge).
H. J. Jefferson, Peel Hall, Chester (White).
C. William Morgan, Balcurvie, Windygates, Fife (Silver).
C. John Simpson, Leather Merchant, Buckie (Silver).

Class 55. GAME—Indian. Cock.

1. John Arnot, Timber Merchant, Sauchie.
2. John Arnot, Timber Merchant, Sauchie.
3. James Murdoch, Mount Oliphant Farm, by Ayr.
V. R. S. Hunter, Fifeshire Poultry Farm, Ladybank.
H. Dr J. K. Goodall, Sutton Lodge, Brimington, Chesterfield.
C. Charles Douglas, M.P., Auchlochan, Lesmahagow.

Class 56. GAME—Indian. Hen.

1. Dr J. K. Goodall, Sutton Lodge, Brimington, Chesterfield.
2. R. S. Hunter, Fifeshire Poultry Farm, Ladybank.
3. John Arnot, Timber Merchant, Sauchie.
V. Charles Douglas, M.P., Auchlochan, Lesmahagow.
C. Charles Douglas, M.P., Auchlochan, Lesmahagow.

Class 57. GAME—Indian. Cockerel.

1. R. S. Hunter, Fifeshire Poultry Farm, Ladybank.
2. John Arnot, Timber Merchant, Sauchie.
V. R. S. Hunter, Fifeshire Poultry Farm, Ladybank.
H. C. Sneddon, Kirkham, Lancashire.

CLASS 58. GAME—Indian. Pullet.

1. C. Sneddon, Kirkham, Lancashire.
2. John Arnot, Timber Merchant, Sauchie.
V. R. S. Hunter, Fifeshire Poultry Farm, Ladybank.
H. R. S. Hunter, Fifeshire Poultry Farm, Ladybank.

CLASS 59. GAME—Old English. Cock.

1. John Hutt, Denend, Cardenden, Fifeshire.
2. John Hutt, Denend, Cardenden, Fifeshire.

CLASS 60. GAME—Old English. Hen.

1. John Hutt, Denend, Cardenden, Fifeshire.
2. John Hutt, Denend, Cardenden, Fifeshire.

CLASS 61. GAME—Modern. Cock.

1. William Melrose, Rosewell, Mid-Lothian (Black Red).
2. Walter B. Longton, Walkinshaw, by Renfrew (Black Red).
H. C. Sneddon, Kirkham, Lancashire.

CLASS 62. GAME—Modern. Hen.

1. C. Sneddon, Kirkham, Lancashire.
2. Walter B. Longton, Walkinshaw, by Renfrew (Black Red).

CLASS 63. GAME—Any Variety, not including Indian. Cockerel.

1. James Birnie, Cluny Terrace, Buckie (Modern).

CLASS 64. GAME—Any Variety, not including Indian. Pullet.

1. Walter B. Longton, Walkinshaw, by Renfrew (Black Red).
2. Alex. Shepherd, Lily Cottage, Forfar (Modern).

CLASS 65. BANTAM—Game, any Variety, including Old English. Cock.

1. Alex. Shepherd, Lily Cottage, Forfar (Modern).
2. Ralph D. Moore, Leabank, Bearsden (Spangled Old English).
3. William Henderson, 41 Rumbling Well, Dunfermline (Pile).
H. Adam & Saddler, Queen Street, Forfar (Duckwing).
C. John Morris, 129 Whitemyre, Dunfermline (Black Red).

CLASS 66. BANTAM—Game, any Variety, including Old English. Hen.

1. William Henderson, 41 Rumbling Well, Dunfermline (Pile).
2. C. Sneddon, Kirkham, Lancashire (Modern).
H. Ralph D. Moore, Leabank, Bearsden (Spangled Old English).

CLASS 67. BANTAM—Any other Variety. Cock.

1. Lady Margaret Douglas Home, The Hirsel, Coldstream (Sebright).
2. John Williamson, Clark Terrace, Bellshill (Pekin White).
3. Henry Pickles, Kayfield House, Earby (Black).
H. John Young, 12 Albany Gardens, Shettleston (Sebright).
C. Andrew Carnduff, Draper, Barrhead (White Pekin).

CLASS 68. BANTAM—Any other Variety. Hen.

1. John Young, 12 Albany Gardens, Shettleston (Sebright).
2. A. K. Crichton, Estate Office, Bridge of Weir (Pekin Cochin, Spangled).
3. John Williamson, Clark Terrace, Bellshill (Pekin Black).
H. James D. M'Taggart, Glenmore, Oban (Black Rosecomb).
C. Lady Margaret Douglas Home, The Hirsel, Coldstream (Sebright).

CLASS 69. Any other recognised Breed of Poultry. Cock.

1. Alex. Ollar, Kilkerran Cottage, Campbeltown (Spanish).
2. F. Anderson, Highholm, Dunfermline (Creve Cœur).
3. Mrs D. Mackenzie, Maryfield, Meigle (Spanish).
V. J. T. Cathcart, Pitcairlie, Newburgh, Fife (Wyandotte Partridge).
H. George Hay, 69 Cumberland Street, Edinburgh (Wyandotte Partridge).
C. James Carlile, 20 Mill Street, Paisley (Houdan).

CLASS 70. Any other recognised Breed of Poultry. Hen.

1. John Meikle, Auchincruive Estates Office, Mount-Hamilton, Ayr (Spanish).
2. William Morgan, Balcurvie, Windygates, Fife (White).
3. The Countess of Home, The Hirsel, Coldstream (Andalusian).
V. Alex. Ollar, Kilkerran Cottage, Campbeltown (Spanish).
H. Mrs D. Mackenzie, Maryfield, Meigle (Spanish).
H. D. Stevenson, Sauchenbush Farm, Kirkcaldy (Andalusian).

CLASS 71. Any other recognised Breed of Poultry. Cockerel.

1. Peter Houston, 25 High Street, Dumbarton (Andalusian).
2. C. Sneddon, Kirkham, Lancashire (Modern Game).

CLASS 72. Any other recognised Breed of Poultry. Pullet.

1. C. Sneddon, Kirkham, Lancashire (Modern Game).
2. Peter Houston, 25 High Street, Dumbarton (Andalusian).

CLASS 73. TABLE FOWLS—Any Breed or Cross, to be judged solely as Table Fowls, and without regard to fancy points. Pair of Cockerels.

1. The Countess of Home, The Hirsel, Coldstream (Indian Game and Buff Orpington).
2. A. K. Crichton, Estates Office, Bridge of Weir (Dorkings).

CLASS 74. TABLE FOWLS—Any Breed or Cross, to be judged solely as Table Fowls, and without regard to fancy points. Pair of Pullets.

1. C. Sneddon, Kirkham, Lancashire (Indian and Dorkings).
2. The Countess of Home, The Hirsel, Coldstream (Indian Game and Buff Orpington).

CLASS 75. DUCKS—Aylesbury. Drake.

1. The Countess of Home, The Hirsel, Coldstream.
2. The Countess of Home, The Hirsel, Coldstream.
3. W. B. Dickinson, Longcroft, Oxton, Berwickshire.

CLASS 76. DUCKS—Aylesbury. Duck.

1. The Countess of Home, The Hirsel, Coldstream.
2. The Countess of Home, The Hirsel, Coldstream.
3. W. B. Dickinson, Longcroft, Oxton, Berwickshire.

CLASS 77. DUCKS—Aylesbury. Drake (Young).

1. The Countess of Home, The Hirsel, Coldstream.
2. The Countess of Home, The Hirsel, Coldstream.

CLASS 78. DUCKS—Aylesbury. Duck (Young).

1. The Countess of Home, The Hirsel, Coldstream.
2. The Countess of Home, The Hirsel, Coldstream.
H. W. B. Dickinson, Longcroft, Oxton, Berwickshire.

CLASS 79. DUCKS—Rouen. Drake.

1. W. Woods, Worksop.
2. The Countess of Home, The Hirsel, Coldstream.
V. The Countess of Home, The Hirsel, Coldstream.

CLASS 80. DUCKS—Rouen. Duck.

1. W. Woods, Worksop.
2. The Countess of Home, The Hirsel, Coldstream.
C. The Countess of Home, The Hirsel, Coldstream.

CLASS 81. DUCKS—Any other Variety. Drake.

1. James Logan, East Linton, Prestonkirk (Pekin).
2. W. Woods, Worksop (Cayuga).
V. S. Dalgleish, Blackburn, Chirnside, Berwickshire (Pekin).
C. Thomas Gardner, Wraes Mill, Neilston (White).

CLASS 82. DUCKS—Any other Variety. Duck.

1. S. Dalgleish, Blackburn, Chirnside, Berwickshire (Pekin).
2. Thomas Gardner, Wraes Mill, Neilston (White Call).
C. Cyril M. Hadden, Baillieswells, Bieldside, Aberdeenshire (Buff Orpington).

CLASS 83. DUCKS—Any Breed (Aylesbury excepted). Drake (Young).

1. The Countess of Home, The Hirsel, Coldstream (Rouen).
2. The Countess of Home, The Hirsel, Coldstream (Rouen).
C. The Scottish Poultry and Game Rearing Co., Ltd., Brumley, Burghmuir, Perth, N.B. (Indian Runners).

CLASS 84. DUCKS—Any Breed (Aylesbury excepted). Duck (Young).

1. The Countess of Home, The Hirsel, Coldstream (Rouen).
2. The Countess of Home, The Hirsel, Coldstream (Rouen).
C. The Scottish Poultry and Game Rearing Co., Ltd., Brumley, Burghmuir, Perth, N.B. (Indian Runner).

CLASS 85. GEESE. Gander.

1. W. Woods, Worksop (Toulouse).
2. J. & A. Muir, Rispain, Whithorn, Wigtownshire (Toulouse).
V. W. Woods, Worksop (Embden).

CLASS 86. GEESE. Goose.

1. W. Woods, Worksop (Toulouse).
2. W. Woods, Worksop (Embden).
H. John Page, Waterside House, Callander (Toulouse Grey).

CLASS 87. TURKEYS. Cock.

1. Miss Shanks, Cuthelton Farm, Denny (Bronze).
2. William Morgan, Balcurvie, Windygates, Fife (American Bronze).
3. W. Cook & Sons, Orpington House, St Mary Cray, Kent (Bronze).
V. George A. Bell, Lundin Mill Farm, Largo (American Bronze).
H. W. Woods, Worksop (Bronze).
C. Thomas H. Harvey, Windyhall, Rothesay (Bronze).

CLASS 88. TURKEYS. Hen.

1. F. G. S. Rawson, Thorpe, Halifax, Yorkshire (American Bronze).
2. W. Woods, Worksop (Bronze).
V. George A. Bell, Lundin Mill Farm, Largo (American Bronze).
H. George A. Bell, Lundin Mill Farm, Largo (American Bronze).
C. Miss Shanks, Cuthelton Farm, Denny (Bronze).

DAIRY PRODUCE

CLASS 1. POWDERED BUTTER, not less than 7 lb.—Premiums, £4, £2, and £1.

1. William Paterson, Barnego, Denny.
2. James Mark, Hyndshaw Farm, Carluke.
3. James Wilson, Boghall, Houston.
V. R. G. Murray, Spittal, Biggar.
H. William Strang, Transy Farm, Dunfermline.

CLASS 2. FRESH BUTTER, Three 1 lb. Rolls.—Premiums, £4, £2, and £1.

1. William Paterson, Barnego, Denny.
2. R. G. Murray, Spittal, Biggar.
3. Walter Little, Drumloch, Chapelton.
V. Mrs Peter Holmes, Faulds Farm, Gourock.
H. Andrew Fleming, Threepland, Eaglesham.

CLASS 3. CHEDDAR CHEESE, 56 lb. and upwards.—Premiums, £12, £7, £4, £3, £2, and £1.

1. J. C. Cunninghame of Dunragit, Dunragit Home Farm.
2. Stephen Hunter, Whiteleys, Stranraer.
3. David A. Hood, Balgreddan, Kirkcudbright.
4. Robert Stevenson, Boghead, Galston.
5. William Hunter, Garthland Mains, Stranraer.
6. James Milroy, East Galdenoch, Stoneykirk.
V. J. & W. Weir, Midtown, New Abbey Road, Dumfries.
H. David Airdrie, Mayfield, Castle-Douglas.
C. James Ferguson, Auchlane Dairy, Castle-Douglas.
C. Hugh Parker, Boreland, Castle-Douglas.

CLASS 4. FLAT WHITE CHEESE, made according to any method, from a Dairy where all the Cheese are made flat, 40 lb. and upwards—Premiums, £5, £4, £3, and £2.

1. John Paterson, Torfoot, Strathaven.
2. William G. Plunkett, Craigneil, Colmonell.
3. Robert Leiper, Yardbent, Strathaven.

CLASS 5. CHEESE, 14 lb. and under.—Premiums, £4, £3, £2, and £1.

1. Robert Stevenson, Boghead, Galston.
2. David Airdrie, Mayfield, Castle-Douglas.
3. Stephen Hunter, Whiteleys, Stranraer.
4. James Milroy, East Galdenoch, Stoneykirk.
V. A. W. Saunders, Dromore Farm, Kirkcudbright.
H. James Borland, Coldcot Hill, Craigie, Ayrshire.
C. Hugh Gilchrist, Torrs, Kirkcudbright.
C. J. & W. Weir, Midtown, New Abbey Road, Dumfries.

JUDGES

Shorthorns.—James Rodger, Keir Mains, Dunblane; R. Stratton, The Duffryn, Newport, Mon.

Aberdeen-Angus.—Henry Lindsay, Home Farm, Glamis; John Murray, Munnieston, Kippen Station.

Galloway.—William Barbour, Cuilpark, Castle-Douglas; William M'Conchie, Mains of Penninghame, Newton-Stewart.

Highland.—Robert Macdiarmid, Castles, Lochawe, Argyllshire; John M'Phail, Ardura, Craignure, Isle of Mull.

Ayrshire.—A. Y. Allan, Redholm, Woodfield Road, Newton, Ayr; William Howie, Finnochbog, Inverkip.

Clydesdales.—George Anderson, West Fingask, Old Meldrum; James M'Clean, Auchneel, Stranraer; Alex. M'Robbie, Sunnyside, Aberdeen; William Neilson, Haining Valley, Linlithgow; William Taylor, Park Mains, Renfrew; James Weir, Sandilands, Lanark.

Hunters.—R. A. Barkley, Palgrave Priory, Diss, Norfolk; Lord Rathdonnell, Lisnavagh, Rathvilly, Co. Carlow.

Hackneys and Harness Classes (two days).—C. E. E. Cooke, Bygrave House, Baldock, Herts.; A. W. Hickling, Adbolton, Nottingham.

Ponies.—Hackney judges.

Polo and Riding Ponies.—T. H. Hutchinson, Manor House, Catterick, Yorks.

Highland Ponies.—William Logan, M.R.C.V.S., Inverness.

Shetland Ponies.—James Duncan, Fern Villa, Inverness.

Blackfaced.—William M. Clark, Blackhope, Heriot; James Murray, Low Ploughland, Strathaven.

Cheviot.—David Hall, Larriston, Newcastleton; Michael Johnstone, Alton, Moffat.

Border Leicester.—Donald Fergusson, jun., Dalcapon, Ballinluig; James Nisbet, Lambden, Greenlaw.

Half-Bred.—William Ballantyne, Wormiston, Eddleston; Andrew T. Elliot, Newhall, Galashiels.

Shropshire.—C. Coxen, Elford Park, Tamworth, Staffs.

Oxford Down.—Shropshire judge.

Suffolk.—J. W. Eagle, The Hall, Walton-on-Naze, Essex.

Fat Sheep.—Half-Bred judges.

Swine.—James Weir, Woodielea Asylum, Lenzie.

Poultry.—D. Bragg, Aikton, Wigton, Cumberland (classes 33 to 38 inclusive, 43 to 54 inclusive, and 59 to 86 inclusive); John Cran, Keith (classes 1 to 32 inclusive, 39 to 42 inclusive, 55 to 58 inclusive, and 87 and 88).

Dairy Produce.—Professor J. Drummond, Dairy School, Kilmarnock.

II.—VETERINARY DEPARTMENT.

Class Examinations—1905.

Silver Medals were awarded to the following:—

ROYAL (DICK) VETERINARY COLLEGE.

Junior Anatomy	John W. Morrow, Coleraine, Ireland.
Senior Anatomy	W. King Clark, North Berwick.
Chemistry	William Brown, Banchory-Ternan, Aberdeen.
Biology	David R. Crabb, New Aberdour, Aberdeen.
Physiology	W. King Clark, North Berwick.
Stable Management	J. G. M'Gregor, Greenock.
Pathology	Alexander M'Turk, Galloway.
Materia Medica	John Taylor, Edinburgh.
Hygiene	Alexander M'Turk, Galloway.
Veterinary Medicine	Charles W. Cartwright, Holywell, North Wales.
Veterinary Surgery	A. E. Willett, Staines, Middlesex.

GLASGOW VETERINARY COLLEGE.

Junior Anatomy	Hubert Gilmour, Dromahair, Co. Leitrim.
Senior Anatomy	Evelyn Meikle, 3 Claremont Terrace, Sunderland.
Chemistry	Charles A. Murray, Newbridge, Co. Kildare.
Biology	Charles A. Murray, Newbridge, Co. Kildare.
Physiology	Evelyn Meikle, 3 Claremont Terrace, Sunderland.
Stable Management	Thomas Clyde, Carluke, N.B.
Pathology	Archibald M'Cunn, Wellbeck, Worksop.
Materia Medica	Valentine M'Leish, Wester Cairnie, Forteviot.
Hygiene	William D. Blair, Dunwood, Dumbarton.
Veterinary Medicine	James W. Tait, Dumbuck, Bowling, N.B.
Veterinary Surgery	George R. M'Call, 4 Wilton Terrace, Glasgow.

22 Large Silver Medals, £14, 0s. 6d.

DISTRICT COMPETITIONS.

			£	s.	d.
23	Districts	—Grants of £12 each (Section I.), less £4, 5s. not awarded	£271	15	0
13	"	Grants of £15 each (Section II.)	195	0	0
9	"	Special Grants	83	0	0
1	"	Special Grant—Inverness Joint Show	25	0	0
22	"	Medals for Shows (52)	33	3	0
16	"	Medals for Cottages and Gardens (26)	6	5	8
227	"	Medals for Ploughing, 1904-5	54	17	2
311			£669	0	10

ABSTRACT OF PREMIUMS.

	£	s.	d.
Glasgow Show	£3192	1	11
District Competitions	669	0	10
Veterinary Colleges	14	0	6
	£3875	3	3

STATE OF THE FUNDS

OF

THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND

As at 30th NOVEMBER 1905.

I. CONSOLS—		
£4,000 2½ per cent Consols at 90		£3,600 0 0
II. HERITABLE BONDS—		
£11,000 at 3½ per cent, £23,500 at 3¼ per cent		34,500 0 0
III. DEBENTURE AND PREFERENCE STOCKS—		
£5,850 N.B. Railway Co. 3 per cent, at 93	£5,440 10 0	
£2,727 Caled. Railway Co. 4 per cent, at 122	3,326 18 9	
£2,347 London and North-Western Railway Company 3 per cent, at 97	2,276 11 9	
£1,212 Mid. Railway Co. 2½ per cent, at 79	957 9 7	
£2,400 Do. do. Perpetual Preference Stock 2½ per cent, at 76	1,824 0 0	
£3,336 N.E. Railway Co. 3 per cent, at 95	3,169 4 0	
£3,336 Gt. N. Railway Co. 3 per cent, at 94	3,135 16 9	
		20,130 10 10
IV. BANK STOCKS*—		
£6,407 7 8 Royal Bank of Scotland, at 263	£16,851 8 4	
£2,218 16 5 Bank of England, at 295½	6,556 12 3	
£2,500 0 0 British Linen Co. Bank, at 512	12,800 0 0	
£2,341 13 4 Bank of Scotland, at 390	9,132 10 0	
		45,340 10 7
£13,467 17 5		
TOTAL AMOUNT OF INVESTED FUNDS		£103,571 1 5
V. ESTIMATED VALUE of Buildings, No. 3 George IV. Bridge	£3,100 0 0	
VI. ESTIMATED VALUE of Furniture, Paintings, Books, &c.	1,000 0 0	
		4,100 0 0
VII. ARREARS OF SUBSCRIPTIONS considered recoverable		117 6 6
VIII. BALANCE DUE BY ROYAL BANK OF SCOTLAND ON ACCOUNTS CURRENT at 30th November 1905		1,728 10 1
AMOUNT OF GENERAL FUNDS		£109,516 18 0
IX. TWEEDDALE MEDAL FUND—		
Heritable Bond, at 3½ per cent		£500 0 0
X. THE ROBERT MURDOCH PRIZE FUND—		
Legacy by the late Miss Murdoch, Blantyre, to be applied in giving a prize of £10 a-year, while it lasts, to the Breeder of the best Clydesdale Brood Mare at the Annual Show of the Society, £100, less duty.		
Amount per last account, including interest		£38 6 2
Interest on Deposit Receipt, dated 20th October 1904, and uplifted 2nd November 1905		0 10 7
		£38 16 9
Transferred to Glasgow Show Account		10 0 0
On Deposit Receipt with Royal Bank, dated 2nd November 1905		£28 16 9

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* The original cost of these Bank Stocks was £23,632, 9s. 4d., showing a profit at present prices of £21,708, 1s. 3d.

JAS. H. GIBSON-CRAIG, *Treasurer.*
ALEXR. CROSS, *Member of Finance Committee.*
WM. HOME COOK, C.A., *Auditor.*

EDINBURGH, 10*th January* 1906.

ABSTRACT of the ACCOUNTS of the HIGHLAND and

CHARGE.

1. **Balances** due by Royal Bank of Scotland on Account Current at 30th November 1904			£1,809 19 10
2. **Cash** on hand at 30th November 1904			5 0 0
3. **Arrears** of Subscriptions outstanding at 30th Nov. 1904		£93 12 0	
Whereof due by Members who have compounded for life, and whose arrears are thereby extinguished	£4 17 0		
Sums ordered to be written off	37 4 0		
		42 1 0	
			51 11 0
4. **Interests and Dividends**—			
(1) Interests—			
On Heritable Bonds, less Income-tax		£1,091 6 8	
On Debenture and Preference Stocks, do.		538 15 10	
On Deposit Receipts		19 16 9	
		£1,649 19 3	
(2) Dividends—			
On Consols, less Income-tax	£95 0 0		
On Bank Stocks	1,668 5 1		
		1,763 5 1	
			3,413 4 4
5. **Subscriptions**—			
Annual Subscriptions		£1,173 11 0	
Life Subscriptions		1,140 15 0	
			2,314 6 0
6. **Transactions**—Sales and Advertisements			48 1 10
7. **Receipts** from Perth Show			4 0 0
8. **Receipts** from Glasgow Show			9,316 6 4
Sum of Charge			£16,962 9 4

AGRICULTURAL SOCIETY of SCOTLAND for the Year 1904-1905.

DISCHARGE.

1. Establishment Expenses—			
Salaries and Wages—Secretary, £900; Clerk, £300; Second Clerk, £200; Messenger, £72			£1,472 0 0
Feu-duty, £28; Taxes, £46, 1s. 11d.			74 1 11
Coals and Gas			29 13 3
Repairs and Furnishings—Special, £157, 9s. 5d.; Ordinary, £36, 10s 9d.			194 0 2
Insurances			17 0 0
			£1,786 15 4
2. Fee to Auditor of Accounts for 1903-1904			75 0 0
3. Education—			
(1) Forestry—			
Vote to Lecturer in Edinburgh University		£50 0 0	
Fees and Expenses of Examiners		25 13 0	
		£75 13 0	
(2) Agriculture—			
Expenses of National Diploma Examination at Leeds		80 17 0	
			156 10 0
4. Chemical Department—			
(1) Salary to Chemist		£40 0 0	
(2) Chemist's Fees for Analyses to Members, and Expenses		65 0 0	
		£105 0 0	
(3) Expenses of Manuring and Sheep-Grazing Experiments, £183, 12s. 6d.—*Less* Grant from Board of Agriculture, £75, and proceeds of Sheep sold, £103, 6s. 6d.		5 6 0	
			110 6 0
5. Veterinary Department—Medals to Students			14 0 6
6. Botanical Department—			
Fee to Botanist for year		£25 0 0	
Testing Samples of Seeds for Members		49 1 0	
			74 1 0
7. Dairy Department—			
(1) Examination at Kilmarnock—Fees and Expenses		£40 2 0	
(2) Sundry Outlays and Expenses		40 17 3	
(3) Special Grant—Vote to Dairy School at Kilmarnock		100 0 0	
		£180 19 3	
Less Fees forfeited by unsuccessful Candidates		7 0 0	
		£173 19 3	
(4) Milk Record Scheme—			
Experts	£96 17 11		
Sundry Outlays	36 2 5		
		133 0 4	
			306 19 7
8. Society's Transactions			865 7 8
9. Ordinary Printing, £102, 15s. 10d.; Advertising, £42, 0s. 1d.; Stationery, Books, &c., £53, 9s. 1d.; Postages, &c., £80; Bank Charges, &c., £10, 17s. 1d.			289 2 1
10. Grants to Public Societies—Scottish Meteorological Society, £20; Society for Prevention of Cruelty to Animals, £5			25 0 0
11. Miscellaneous Payments			102 2 6
12. Investments made			2,500 0 0
13. Payments in connection with Perth Show, 1904			137 1 0
14. Payments in connection with Glasgow Show, 1905—Premiums, £3063, 8s. 10d.; Medals, £11, 18s. 1d.; Expenses, as per page 422 of Show Account, £4912, 11s. 3d.			7,987 13 2
15. Premiums for Local Shows and District Competitions—Premiums, £230; Medals, £116, 1s. 1d.; Special Grants, £285			631 1 1
16. Trials of Dung Spreaders			10 14 4
17. Arrears struck off as irrecoverable			44 18 6
18. Arrears outstanding at 30th November 1905			117 6 6
19. Balances due by Royal Bank of Scotland on Accounts Current at 30th November 1905—			
Edinburgh Account		£1,611 10 1	
London Account		117 0 0	
			1,728 10 1
Sum of Discharge			£16,962 9 4

JAS. H. GIBSON-CRAIG, *Treasurer.*
ALEXR. CROSS, *Member of Finance Committee.*
WM. HOME COOK, C.A., *Auditor.*

Edinburgh, 10*th January* 1906.

ABSTRACT of the ACCOUNTS

CHARGE.

1. LOCAL SUBSCRIPTIONS—		
Lanarkshire Voluntary Subscription		£503 10 6
Ayrshire " "		501 8 11
Renfrewshire " "		150 0 0
Buteshire " "		76 0 0
Argyllshire—Subscription by Commissioners of Supply		112 11 9
City of Glasgow		250 0 0
R. A. Oswald of Auchencruive—Donation		10 0 0
W. J. Yorke Scarlett of Gigha "		2 2 0
Town Council of Pollokshaws "		1 1 0
		£1,606 14 2
2 AMOUNT COLLECTED DURING SHOW—		
Drawn at Gates	£3,702 10 0	
Drawn at Grand Stands	405 6 9	
Catalogues and Awards sold	347 5 4	
Cloak-Rooms, Messengers' Tickets, &c.	5 12 4	
		4,460 14 5
3. FORAGE SOLD		12 15 7
4. RENT OF STALLS		2,348 17 0
5. RENT OF REFRESHMENT BOOTHS		250 0 0
6. ADVERTISEMENTS IN CATALOGUE AND PREMIUM LIST		112 19 9
7. SUBSCRIPTIONS IN AID OF PREMIUMS		495 12 0
8. INCOME FROM TWEEDDALE MEDAL FUND		15 8 10
9. INTEREST FROM ROYAL BANK		13 4 7
		£9,316 6 4

Note.—From the above balance of	£1328 13 2
There falls to be deducted—	
Premiums undrawn at 30th November 1905, amounting to	117 0 0
Making the probable Surplus	£1211 13 2

of the GLASGOW SHOW, 1905.

DISCHARGE.

1. SHOWYARD EXPENDITURE—						
Fitting up Showyard				£2,606	4	4
Glasgow Agricultural Society for Showyard Equipment				450	0	0
Rosettes, £34, 8s. 2d.; Felt for Stand Seats, £11; Plans and Specifications, £13, 10s.				58	18	2
Miscellaneous				9	19	8
				£3,125	2	2
2. FORAGE				295	12	5
3. POLICE				30	0	0
4. TRAVELLING EXPENSES of Judges, Stewards, &c.				130	18	9
5. HOTEL AND LUNCHEONS—						
Hotel Bill for 32 Directors, 7 Stewards, 36 Judges	£176	9	7			
Luncheons and Breakfasts in Showyard for Directors, Judges, and Committee	140	9	0	316	18	7
6. MUSIC				85	0	0
7. PRINTING				331	5	9
8. ADVERTISING and Bill-posting				193	7	1
9. HIGHLAND INDUSTRIES				7	0	0
10. VETERINARY INSPECTION				10	10	0
11. CONCERT for Attendants				3	1	0
12. AUDITOR				25	0	0
13. FORESTRY EXHIBITION (Prizes awarded)				18	0	0
14. ASSISTANTS and Attendants				191	15	10
15. TRIALS of Suction Gas Producers and Swathe Turners				74	16	11
16. POSTAGES				61	0	0
17. MISCELLANEOUS				13	2	9
				£4,912	11	3
18. PREMIUMS drawn at 30th November 1905				3,075	1	11
				£7,987	13	2
BALANCE OF RECEIPTS				1,328	13	2
				£9,316	6	4

JAS. H. GIBSON-CRAIG, *Treasurer.*
ALEXR. CROSS, *Member of Finance Committee.*
WM. HOME COOK, C.A., *Auditor.*

EDINBURGH, 10*th January* 1906.

ABSTRACT of the ACCOUNTS of the

CHARGE.

I. FUNDS as at 30th November 1904—		
£3,193, 6s. 8d. 3 per cent Debenture Stock of the North British Railway Company, purchased at		£2,650 0 0
Amount on Heritable Bond, at 3¼ per cent		3,500 0 0
£550 Lancashire and Yorkshire Railway Company 3 per cent Debenture Stock, purchased at		611 10 6
£190 London and North-Western Railway Company 4 per cent Debenture Stock, purchased at		259 1 11
		£7,020 12 5
BALANCE in Royal Bank on Account Current		294 7 6
		£7,314 19 11
II. INTEREST—		
On £3,193, 6s. 8d. North British Railway Company 3 per cent Debenture Stock, £95, less tax £4, 15s. 9d.	£91 0 3	
On £3,500 on Heritable Bond at 3¼ per cent, £113, 15s., less tax £5, 13s. 9d.	108 1 3	
On £550 Lancashire and Yorkshire Railway Company 3 per cent Debenture Stock, £16, 10s., less tax 16s. 6d.	15 13 6	
On £190 London and North-Western Railway Company Guaranteed 4 per cent Stock, £7, 12s., less tax 7s. 8d.	7 4 4	
		221 19 4
III. MISCELLANEOUS RECEIPT—		
Refunded by Colonel Bunbury, his son promoted		20 0 0
SUM OF CHARGE		£7,556 19 3

ARGYLL NAVAL FUND for Year 1904-1905.

DISCHARGE.

I. Allowances to the six following Recipients—

John S. Gordon Fraser (seventh year)				£40	0	0
Evan Campbell Bunbury (fourth year)				40	0	0
Gordon Campbell (third year)				40	0	0
Donald Patrick C. Campbell (second year)				40	0	0
John S. Binny Scott (second year)				40	0	0
John A. Dalrymple Campbell (first year), for half-year				20	0	0
				£220	0	0

II. Funds at 30th November 1905—

£3,193, 6s. 8d. 3 per cent Debenture Stock of the North British Railway Company, purchased at	£2,650	0	0			
Amount on Heritable Bond, at 3½ per cent	3,500	0	0			
£550 Lancashire and Yorkshire Railway Company 3 per cent Debenture Stock, purchased at	611	10	6			
£190 London and North-Western Railway Company 4 per cent Debenture Stock, purchased at	259	1	11			
	£7,020	12	5			
Balance in Royal Bank on Account Current	316	6	10			
				7,336	19	3
Sum of Discharge				£7,556	19	3

JAS. H. GIBSON-CRAIG, *Treasurer.*
ALEXR. CROSS, *Member of Finance Committee.*
WM. HOME COOK, C.A., *Auditor.*

Edinburgh, 10*th January* 1906.

VIEW OF RECEIPTS AND PAYMENTS

For the Year 1904-1905.

RECEIPTS.

1. Annual Subscriptions and Arrears received		£1,062 17 0
2. Life Subscriptions		1,140 15 0
		£2,203 12 0
3. Interests and Dividends—		
Interests	£1,649 19 3	
Dividends	1,763 5 1	
		3,413 4 4
4. Transactions		48 1 10
5. Receipts from Perth Show		4 0 0
6. Receipts from Glasgow Show		9,316 6 4
Sum of Receipts		£14,985 4 6

PAYMENTS.

1. Establishment Expenses—			
Salaries and Wages		£1,472 0 0	
Feu-duty, Taxes, Coal, Gas, Insurance, Repairs, and Furnishings		314 15 4	
		£1,786 15 4	
2. Fee to Auditor of Accounts for 1903-1904		75 0 0	
3. Education		156 10 0	
4. Chemical Department		110 6 0	
5. Veterinary Department		14 0 6	
6. Botanical Department		74 1 0	
7. Dairy Department		306 19 7	
8. Society's Transactions		865 7 8	
9. Ordinary Printing, Advertising, Stationery, Postages, and Bank Charges		289 2 1	
10. Grants to Public Societies		25 0 0	
11. Trials of Dung Spreaders		10 14 4	
12. Miscellaneous Payments		102 2 6	
13. Investments made	£2,500 0 0		
14. Payments in connection with Perth Show		137 1 0	
15. Payments in connection with Glasgow Show—			
Premiums	£3,075 1 11		
General Expenses	4,912 11 3		
		7,987 13 2	
16. Premiums for Local Shows and District Competitions		631 1 1	
Sum of Payments			12,571 14 3
Balance of Receipts			£2,413 10 3

JAS. H. GIBSON-CRAIG, *Treasurer.*
ALEXR. CROSS, *Member of Finance Committee.*
WM. HOME COOK, C.A., *Auditor.*

Edinburgh, 10*th January* 1906.

PROCEEDINGS AT BOARD MEETINGS.

MEETING OF DIRECTORS, 1ST FEBRUARY 1905.

Present.—Vice-President—Mr Charles Howatson of Glenbuck. *Ordinary Directors*—Mr Alex. Cross of Knockdon; Mr A. H. Anderson, Kippendavie Estate Office; the Right Hon. the Earl of Mansfield; Mr John M'Caig, Challoch; Mr John Cran, Kirkton; Mr James Stenhouse, Turnhouse; Mr Andrew Hutcheson, Beechwood; Mr E. Douglas Paton, Broomhill; Mr Alex. M. Gordon of Newton; Sir Robert D. Moncreiffe of Moncreiffe, Bart.; Sir Archibald Buchan Hepburn of Smeaton, Bart.; the Very Rev. John Gillespie, LL.D., Mouswald Manse; Mr C. H. Scott Plummer of Sunderland Hall; Mr John M'Hutchen Dobbie, Campend; Mr David Wilson, D.Sc., of Carbeth; Mr Thomas Gordon Duff of Drummuir; Mr H. M. Leadbetter, Legerwood. *Extraordinary Directors*—Mr J. Harling Turner, Kilmarnock; Mr John Speir, Newton Farm; Mr R. Shirra Gibb, Boon; Mr John M. Martin, Murieston House; Mr John Ballingall, Dunbog; Mr F. W. Christie, Dairsie Mains; Mr John Wilson, Chapelhill; Mr John M. Aitken, Norwood. *Honorary Secretary*—Sir John Gilmour of Montrave, Bart. *Chemist*—Mr James Hendrick. *Auditor*—Mr William Home Cook, C.A. The Earl of Mansfield in the chair.

The minutes of the general meeting were approved of.

Letters of thanks were read from Sir Henry Craik and Sir Thomas Elliott for their election as honorary members of the Society.

Glasgow Show, 1905.

Local Funds.—A subscription of a guinea towards the local fund was intimated from the Town Council of Pollokshaws, and it was agreed to accept it with thanks.

Hunter Classes.—The Secretary submitted a list of classes and prizes for Made Hunters, as adjusted in consultation with Mr Cross of Knockdon, through whom a sum of £200 had been guaranteed in aid of the prizes for these classes.

The recommendations were unanimously approved, with the provision that if the entries of Hunters owned by tenant-farmers should exceed twenty they might be formed into two classes with the addition of £30 to the prize-money.

Pony and Driving Classes.—It was stated that the prize-money for Driving Classes would now amount to £220, of which £80 had been contributed by private subscribers. The Driving Classes and prizes were adjusted, and it was arranged that the van horses and geldings in harness would not be stabled in the yard but only brought in to be judged on the Thursday.

Special Prizes.—The following special prizes by Mr Howatson of Glenbuck were accepted, and a vote of thanks accorded to him:—

1. For Blackface Shearling Ram in the ordinary Shearling Ram class, best fitted for producing stock to yield early-maturity mutton, and carrying the fleece best adapted for protecting the animal in a high, exposed, and stormy district—Prizes of £4, £2, and £1.
2. For the best Blackface Ram Lamb, either drawn from the ordinary Ewe class or specially entered with their dams, which may be clipped or unclipped, and which will not be judged—Prizes of £4, £2, and £1.

Trial of Swathe Turners.—It was agreed to hold a trial of swathe turners in the Glasgow Show district this year.

Border Show, 1906.

A letter was read from Mr Deuchar, superintendent of the North British Railway Company, acknowledging receipt of intimation of the final resolution to hold the Show of 1906 at Peebles, and concluding as follows: "To prevent misunderstanding, and as there is no change in the circumstances, I am sorry that, for the reasons mentioned in my letter of the 16th November last, I am obliged to repeat the intimation that this company will not run excursion trains, or grant cheap travelling facilities on that occasion, as we have had pleasure in doing in previous years."

Mr **Hutcheson** said that it was he who moved that the Show be held at Peebles. He wished to say that he thought it was beneath the dignity of a railway company such as the North British to write a letter in these terms.

The matter then dropped.

Consulting Chemist.

Dr **Wilson** intimated that the Science Committee had gone over the conditions of Mr Hendrick's appointment as consulting chemist, and they agreed to recommend that they be practically the same as those under which the late Dr Aitken held the appointment.

This was agreed, and Mr Hendrick was called in and introduced by the Chairman to the Directors.

Milk Records.

It was agreed to go on with the taking of milk records in conjunction with the Ayrshire Agricultural Association during the current year.

Lighting of Farm Carts.

On the motion of Mr **M'Hutchen Dobbie**, it was remitted to a Special Committee to watch over agricultural interests in connection with the Lighting of Vehicles Bill.

Examinations.

On the motion of Mr **Speir**, it was remitted to the following Committee to consider and report as to the steps to be taken for carrying through the work of the Society for the promotion of Agricultural Education under the New Royal Charter, and in accordance with the Resolutions adopted at the General Meeting of Members on 11th January, viz.: The Chairman of the Board, Sir John Gilmour, Rev. Dr Gillespie, Mr David Wilson, Mr Cross, Mr Speir, Mr Marr.

MEETING OF DIRECTORS, 1st MARCH 1905.

Present.—Vice-President—Mr Charles Howatson of Glenbuck. *Ordinary Directors*—Mr St Clair Cunningham, Hedderwick Hill; Mr Alex. Cross of Knockdon; Mr A. H. Anderson, Kippendavie; Mr William Duthie, Tarves; Mr John Cran, Kirkton; Mr James Stenhouse, Turnhouse; Mr William Clark, Netherlea; Mr Andrew Hutcheson, Beechwood; Mr E. Douglas Paton, Broomhill; Mr Alex. M. Gordon of Newton; Sir Archibald Buchan Hepburn of Smeaton, Bart.; the Very Rev. John Gillespie, LL.D., Mouswald Manse; Mr Jonathan Middleton, Clay of Allan; Mr John M'Hutchen Dobbie, Campend; Mr David Wilson, D.Sc., of Carbeth; Mr H. M. Leadbetter, Legerwood. *Extraordinary Directors*—Mr James Campbell of Kilberry; Mr F. W. Christie, Dairsie Mains; Mr John Wilson, Chapelhill, Edinburgh; Mr James I. Davidson, Saughton Mains. *Treasurer*—Sir James H. Gibson-Craig of Riccarton, Bart. *Honorary Secretary*—Sir John Gilmour of Montrave, Bart. The Earl of Mansfield in the chair.

The **Chairman**, at the outset, made feeling reference to the death of Mr R. Sinclair Scott, which had occurred suddenly in Glasgow the previous evening.

It was agreed to place upon their minutes an expression of deep regret at the death of their colleague, and of their sense of the valuable services which for many years he had rendered to the Society.

Glasgow Show, 1905.

Prizes for Hunter Brood Mares.—Sir **John Gilmour** stated that he was authorised by Captain Clayhills Henderson to intimate that he would be pleased to increase his offer of prizes for Hunter Brood Mares to £35, so that the prizes would be £20, £10, and £5.

The Board cordially accepted the offer of Captain Clayhills Henderson, and instructed the Secretary to convey their hearty thanks to him.

Local Committee.—The SECRETARY submitted Minute of the Meeting of the Glasgow Show District Directors, held at Glasgow on the 15th February, when the usual Local Committee was appointed.

The SECRETARY stated that he had received from Mr Yorke Scarlett of Gigha a donation of £2, 2s. to the Local Fund. The Secretary was instructed to convey the cordial thanks of the Board to Mr Yorke Scarlett.

Mr CAMPBELL of Kilberry intimated that the Commissioners of Supply for the County of Argyll were raising a contribution towards the Funds of the Glasgow Show. Mr Campbell's statement was received by the Board with much satisfaction.

Derby Sweepstakes of the Glasgow Agricultural Society.—In accordance with notice given by the late Mr Sinclair Scott, Mr CLARK moved the suspension of Standing Order No. 38, to enable him to submit the following motion: "That animals competing for the Derby Sweepstakes of the Glasgow Agricultural Society—and which are not entered in the ordinary Classes at the Highland and Agricultural Society's Show at Glasgow—shall only be required to be present and remain in the Show-ground on the day fixed for Judging the Derby Competitions."

Mr ST CLAIR CUNNINGHAM seconded.

On a show of hands being taken, 13 voted for the motion, but as this did not constitute two-thirds of the Directors present the subject could not be proceeded with.

Border Show, 1906.

In accordance with the decision of the Board at its Meeting on 7th December 1904, Dr GILLESPIE moved: "That a deputation of Directors be appointed to confer with the officials of the North British Railway, in order to endeavour to secure proper railway facilities in connection with the Show to be held at Peebles in 1906."

Mr CROSS seconded.

The motion was unanimously agreed to, and the deputation appointed as follows: Mr Scott Plummer (Convener), Sir Archd. Buchan Hepburn, Bart., Mr St Clair Cunningham, Mr Leadbetter, Mr John Wilson, and Mr Stenhouse.

Agricultural Education.

On the recommendation of the Special Committee appointed at last meeting it was resolved—(1) That a Standing Committee, to be called the Committee on Education, be appointed for the purpose of carrying out the Society's educational work under the extended powers now possessed by the Society; (2) That the existing arrangements with the Royal Agricultural Society of England for the joint examinations for the National Diplomas in Agriculture and Dairying be continued; and (3) That the representatives of this Society on the National Agricultural Examination Board be the members of the Society's Committee on Education for the time being—the Society's Standing Committee on Education being thus constituted as follows: Rev. Dr Gillespie (Chairman), Mr David Wilson, Mr Alex. Cross, Mr John Speir, the Chairman of the Board, and Mr James Macdonald (Secretary).

Agricultural Colleges.

The SECRETARY submitted (1) an application for a grant in aid of the Fund for the erection of laboratories for the West of Scotland Agricultural College; (2) an application for a supplementary grant towards the Fund for the extension of the buildings of the Edinburgh and East of Scotland College of Agriculture.

On the motion of the Rev. Dr GILLESPIE, seconded by Mr ANDERSON, the applications were remitted to the Finance Committee for consideration and report.

Agricultural Co-operation in Orkney.

The Standing Orders were suspended to enable the CHAIRMAN to bring under the notice of the Board a proposal to form an Agricultural Organisation Society amongst the crofters on the Island of Eday, Orkney. He moved that it be remitted to the General Purposes Committee for consideration and report as to whether the patronage or assistance of the Highland and Agricultural Society should be given to the new Society if such should be asked for.

The motion was unanimously adopted.

MEETING OF DIRECTORS, 5TH APRIL 1905.

Present.—Vice-President—Mr Charles Howatson of Glenbuck. *Ordinary Directors*—Mr St Clair Cunningham, Hedderwick Hill; Mr Alex. Cross of Knockdon; Mr A. H. Anderson, Kippendavie Estate Office; Mr C. J. Cunningham, Wooden; Mr John Cran, Kirkton; Mr James Stenhouse, Turnhouse; Mr Wm. Clark, Netherlea; Mr E. Douglas Paton, Broomhill; Mr John Murray, Munnieston; Sir Archd. Buchan Hepburn of Smeaton, Bart.; the Very Rev. John Gillespie, LL.D., Mouswald Manse; Mr C. H. Scott Plummer of Sunderland Hall; Mr John M'Hutchen Dobbie, Campend; Mr David Wilson, D.Sc., of Carbeth; Mr Thomas Gordon Duff of Drummuir. *Extraordinary Directors*—Mr J. Campbell Murray, Haggs Castle; Mr John Speir, Newton Farm; Mr Walter Elliot, Ardtornish; Mr R. Shirra Gibb, Boon; Mr John M. Martin, Midcalder; Mr C. M. Cameron, Balnakyle; Mr John Ballingall, Dunbog; Mr John Wilson (Chapelhill), Edinburgh; Mr Andrew Ralston, Glamis. *Chemist*—Mr Jas. Hendrick. *Auditor*—Mr William Home Cook, C.A. Sir John Gilmour in the chair.

The late Mr Fletcher Norton Menzies.

Before proceeding with the business of the meeting, the Chairman made appropriate reference to the death of Mr Fletcher Norton Menzies, the late Secretary to the Society. It was resolved that a resolution of condolence be recorded in the minutes and copies of it sent to the widow and daughter of Mr Menzies.

Glasgow Show, 1905.

Local Committee.—Mr Alex. Cross of Knockdon was appointed Convener of the Local Committee, in room of the late Mr Sinclair Scott.

Arbiter.—The Secretary stated that a Committee of the Glasgow Agricultural Society suggested that either of the two following gentlemen be appointed to act as Arbiter for the settlement of any matter of difference between the Highland and Agricultural Society and the Glasgow Agricultural Society in connection with the use of the Scotstoun Show-ground for the Highland Show of 1905—viz., Mr John L. Murray of Heavyside, Biggar, and Mr W. H. Ralston, Dunragit Estate Office, Dunragit.

Mr Cross moved the appointment of Mr Ralston.

Mr St Clair Cunningham seconded, and the motion was unanimously adopted.

Peebles Show, 1906.

It was resolved that the Peebles Show of 1906 be held on Tuesday, 17th July, and three following days.

Lighting Farm Carts.

The Committee on Lighting of Vehicles Bill reported that as the Lighting Bill had not yet been printed, the Committee could not complete consideration of the subject remitted to them, and therefore desired to be continued, it being stated that in the meantime the Committee were unanimous in holding that the proposal to make it compulsory for all vehicles and persons in charge of cattle and sheep on the highway after dusk to carry lights ought not to be given effect to.

Publications Committee.

Dr Gillespie reported that the Committee recommended payments amounting to £160 for articles included in the volume of the 'Transactions' for this year, and one article held over till next year. A report of the experiments on hill pasture carried out during the last four years will also be embodied in the 'Transactions,' and a special vote of thanks was passed to Dr Wilson of Carbeth for his work in the preparation of this report.

Education Committee.

The first meeting of the reconstituted Education Committee was held that day, and empowered the Secretary to carry through the general details necessary for the examinations to be held in 1905.

The examination in forestry takes place this month, and some alteration of the existing standards has been sanctioned. For a first-class certificate a 75 per cent pass in the central subject will be required, and a 60 per cent pass in the other subjects, and for a second-class certificate a 60 per cent pass in the central subject and a 50 per cent pass in the others. The following gentlemen have been added to the list of examiners in forestry: Dr Nisbet; Mr A. C. Forbes, Newcastle; and Mr J. F. Annand, Peebles. Mr Hendrick, the newly elected Chemist of the Society, takes the place of the late Dr Aitken as examiner in chemistry.

MEETING OF DIRECTORS, 3RD MAY 1905.

Present.—Vice-President—Mr Charles Howatson of Glenbuck. *Ordinary Directors*—Mr Alex. Cross of Knockdon; Mr A. H. Anderson, Kippendavie Estates Office; Mr John M'Caig, Challoch; Mr John Cran, Kirkton; Mr James Stenhouse, Turnhouse; Mr J. Ernest Kerr, Harviestoun Castle; Mr Alex. M. Gordon of Newton; Sir Archd. Buchan Hepburn of Smeaton, Bart.; the Very Rev. John Gillespie, LL.D., Mouswald Manse; Mr Jonathan Middleton, Clay of Allan; Mr John M'Hutchen Dobbie, Campend; Mr Wm. Taylor, Park Mains; Mr W. S. Ferguson, Pictstonhill; Mr Thomas Gordon Duff of Drummuir; Mr John Macpherson Grant, younger of Ballindalloch; Mr H. M. Leadbetter, Legerwood. *Extraordinary Directors*—Colonel R. K. Stewart, Murdostoun Castle; Mr J. Windsor Stuart, Bute Estate Office; Mr John Speir, Newton Farm; Mr R. Shirra Gibb, Boon; Mr John M. Martin, Muirieston House; Mr Robert Paterson, Hill of Drip; Mr John Ballingall, Dunbog; Mr F. W. Christie, Dairsie Mains; Mr John Wilson, Chapelhill, Edinburgh; Mr John M. Aitken, Norwood. *Treasurer*—Sir James H. Gibson-Craig of Riccarton, Bart. *Hon. Secretary*—Sir John Gilmour of Montrave, Bart. *Chemist*—Mr Jas. Hendrick, B.Sc., F.I.C., Aberdeen. The Earl of Mansfield in the chair.

Glasgow Show, 1905.

Principal M'Call, F.R.C.V.S., was unanimously elected veterinary surgeon for the Glasgow Show.

Attending members for the different classes of stock were appointed.

Driving Classes.—A lengthened discussion took place on the conditions for the driving classes. In the Premium List which has been issued, the following condition appears: "Animals shown in pairs may be drawn from the other classes, or entered specially; animals driven tandem cannot also be shown in double harness."

Mr J. M. MARTIN moved the abolition of the last clause, and argued in favour of driving horses having permission to compete in single, double, or tandem classes. Mr WM. TAYLOR seconded.

Dr GILLESPIE moved that the regulation stand. Mr SHIRRA GIBB seconded.

Mr W. S. FERGUSON, steward of horses, pointed out the impossibility in the parades of having the same animals entered in different classes.

On a division being taken, the regulation was carried by twelve votes to eleven for Mr J. M. Martin's motion.

Local Fund.—A donation of £10 was intimated from Mr R. A. Oswald of Auchencruive towards the local fund, and a vote of thanks was accorded him.

Implements.—Mr J. MIDDLETON, as steward of implements, reported as follows: "The Committee appointed to consider the applications for space at the Glasgow Show have met and have had before them information as to the extent of space available in the various sections of the implement yard, and as to the extent of space applied for. The Committee were glad to find that in response to the representations of the Directors as to the limited area of the Showyard, a large number of implement exhibitors had lessened their demands for space, and the Committee feel sure the Directors will appreciate the kindly co-operation of those exhibitors in overcoming the exceptional difficulty which arose in this connection. The extent of space applied for is still considerably in excess of the available ground, and, much to their regret, the Committee were unable to let several firms have the full extent of space asked for."

Circuit of Shows.

The following recommendations by the Special Committee on Circuit of Shows were unanimously adopted:—

(*a*) That the circuit of the Show of the Society be changed to the following—

1905 . . .	Glasgow.	1909 . . .	Stirling.
1906 . . .	Borders.	1910 . . .	Inverness.
1907 . . .	Edinburgh.	1911 . . .	Dumfries.
1908 . . .	Aberdeen.	1912 . . .	Perth.

(*b*) That the Show be held in rotation in these various districts, provided a suitable site is available and that satisfactory financial and other arrangements can be made.

The main object aimed at was to secure as long an interval as possible between Shows held at centres near to each other.

Science.

Abortion in Cows.—The Board took into consideration the recommendations of the Science Committee regarding the investigations as to Abortion in Cows about to be undertaken by the Board of Agriculture. The Society had entered into correspondence with the Board of Agriculture urging the importance of exhaustive investigations being carried out regarding abortion amongst cows; and in the hope of strengthening the hands of the Board in appealing to the Treasury for funds, the expectation was expressed that, if need be, the Society would give financial aid. The Science Committee now recommended that power be given to the Committee to contribute to the costs of these abortion investigations up to a sum not exceeding £500, providing it should be found that the funds granted by the Treasury are insufficient to enable the Departmental Committee to satisfactorily complete the inquiries. On the motion of Mr **Ferguson**, seconded by Mr **Aitken**, the recommendations of the Science Committee were unanimously adopted, it being understood that the grant of £500 be subject to the approval of the next General Meeting of members.

Sheep Scab Order.

Sir **John Gilmour**, in the absence of Mr Audrew Hutcheson, moved the following motion, of which notice had been given by the latter: "That the Board take into consideration the Sheep Movement Order, to come into force on 1st June."

Mr **Anderson** seconded.

Mr **Ferguson** moved as an amendment, that the matter be not taken into consideration.

Mr **Macpherson Grant** seconded.

On a show of hands being taken, the motion was carried by 15 votes to 6.

Sir **John Gilmour** moved as follows: "That this Board urge the Board of Agriculture to, as far as possible, modify the Sheep Scab (Regulation of Movement) Order of 1905, that the Board approve of compulsory dipping twice a-year, and that it urge the Board of Agriculture to take steps to follow up to their source outbreaks of sheep scab, and deal drastically with these outbreaks where they occur."

Mr **Ballingall** seconded.

Mr **M'Hutchen Dobbie** moved: "That a Committee be appointed to consider the Sheep Scab Order, and further, that a deputation be sent to the Meeting of Representatives of Local Authorities to be held at Perth on Friday, 5th inst."

Mr **Macpherson Grant** seconded.

Mr **Shirra Gibb** moved: "That the Board support the action of the Board of Agriculture with regard to the Sheep Scab Movement Order."

Mr **Leadbetter** seconded.

The Board having divided, there voted for Mr Shirra Gibb's amendment, 4; for Mr M'Hutchen Dobbie's amendment, 9; and for Sir John Gilmour's motion, 10.

On Sir John Gilmour's motion being put to the meeting as a substantive motion, it was adopted by 11 votes to 10.

Forestry Examination.

The Education Committee reported the results of the recent Forestry Examination, and recommended that this Examination be held annually, instead of every second year as in recent years. This was agreed to.

Mr A. T. Gillanders, Alnwick, was appointed an additional Examiner in Forestry.

General Purposes Committee.

On the recommendation of the General Purposes Committee, it was resolved that a sum of £12 be placed in the hands of a Special Committee, to be expended for the benefit of the Crofters in the Island of Eday, Orkney, chiefly in the introduction of improved breeds of Poultry.

The Pharmacy Bill.

In the absence of Mr John M'Caig, Rev. Dr **Gillespie** moved: "That the attention of the Board of Agriculture be called to the Pharmacy Bill now before Parliament, and that the Board be requested to take steps to prevent interference with the sale by general merchants of Sheep Dips and other poisonous materials employed in Agriculture and Forestry, provided such dips and other materials are sold in sealed tins, sealed packets, or sealed bottles."

Mr **Macpherson Grant** seconded, and the motion was unanimously agreed to.

Over-Dressing of Barley.

A letter was read from Messrs Hugh Baird & Sons, Glasgow, suggesting that a Conference as to the Over-dressing of Barley, such as was held at the Highland Show at Inverness in 1901, be held in the Society's Showyard at Glasgow next July.

The Directors were of opinion that it would be difficulty for the Society, during the pressure of the Show work, to organise this Meeting; but on the motion of Mr J. M. **Martin**, the Secretary was instructed to intimate to the Messrs Baird that if they should be disposed to arrange the Conference the Society would place a room in the Showyard at their disposal for the purpose.

MEETING OF DIRECTORS, 7TH JUNE 1905.

Present. — *Vice-President* — Mr Charles Howatson of Glenbuck. *Ordinary Directors*—Mr Alex. Cross of Knockdon; Mr A. H. Anderson, Kippendavie Estate Office; Mr William Duthie, Tarves; Mr John Cran, Kirkton; Mr James Stenhouse, Turnhouse; Mr Wm. Clark, Netherlea Farm; Mr Andrew Hutcheson, Beechwood; Mr E. Douglas Paton, Broomhill; Mr John Murray, Munnieston; Mr Jonathan Middleton, Clay of Allan; Mr John M'Hutchen Dobbie, Campend; Mr W. S. Ferguson, Pictstonhill; Mr David Wilson, D.Sc., of Carbeth; Mr H. M. Leadbetter, Legerwood. *Extraordinary Directors*—Mr John Speir, Newton Farm; Mr R. Shirra Gibb, Boon; Mr John M. Martin, Murieston House; Mr C. M. Cameron, Balnakyle; Mr Robert Paterson, Hill of Drip; Mr John Ballingall, Dunbog; Mr John Wilson, Chapelhill; Mr Andrew Ralston, Glamis; Mr James I. Davidson, Saughton Mains. *Honorary Secretary*—Sir John Gilmour of Montrave, Bart. Mr Gordon of Newton in the chair. *Chemist*—Mr James Kendrick, B.Sc., F.I.C., Aberdeen.

It was resolved to record in the minutes a resolution of regret at the death of Mr James Farquhar, who had been Showyard contractor to the Society for twenty-three years.

Glasgow Show, 1905.

Contributions to the Local Fund.—The SECRETARY intimated receipt of £503, 10s. 6d. raised by voluntary assessment in Lanarkshire, of £501, 8s. 11d. similarly raised in Ayrshire, and £112, 11s. 9d. contributed by the Commissioners of Supply in Argyllshire.

Implement Trials.—The SECRETARY reported that six firms had entered for the trials of engines for suction gas-producers. These trials would be carried out before the opening of the Show, but the engines would be shown in operation during the Show. Five firms had entered in the swathe-turner competition, and the arrangements for the trial were left in the hands of Mr Speir and the Secretary. The trials for potato-diggers and potato-dressers had been abandoned, as only two entries were received of the former and one of the latter. There were no entries of turnip-lifters.

Border Show, 1906.

Letters were submitted from the County Clerks of the Counties of Berwick and Selkirk intimating that their County Councils had resolved to levy a voluntary assessment in aid of the expenses of the Border Show, to be held at Peebles in 1906.

Edinburgh Show, 1907.

The SECRETARY stated that the Committee appointed to look out for a site for the Edinburgh Show of 1907 had made some progress in carrying out the remit made to them. The Committee was continued, with powers to complete arrangements for a site for the Showyard.

Abortion in Cows.

A letter was read from the Board of Agriculture thanking the Society for its co-operation in the investigations to be undertaken regarding abortion in cows.

Sheep Scab Orders.

Letters were submitted from the Board of Agriculture relating to the Sheep Scab Orders.

After some discussion the following resolution, moved by Dr WILSON and seconded by Mr FERGUSON, was unanimously adopted—viz., "That the Compulsory Dipping Order should be extended to the whole of Scotland."

Royal (Dick) Veterinary College.

A letter was read from the Town Clerk of Edinburgh forwarding copy of a scheme for the reconstruction of the Royal (Dick) Veterinary College, Edinburgh, under which scheme the Highland and Agricultural Society is invited to appoint a representative to act on the Board to be elected for the management of the reorganised College.

Mr John M. Martin was appointed to represent the Society on the Joint Board.

Fertilisers and Feeding Stuffs Acts.

The Science Committee reported its finding regarding the Departmental Committee's recommendations on the Fertilisers and Feeding Stuffs Acts. It approved of recommendations *A* to *E* without remark. On *F*, which recommends that the district analyst should reside in his district, the Committee observed that it was of more importance that the analyst should be a thoroughly qualified and competent agricultural chemist than that he should reside in the district. Recommendations *G* to *Q* (inclusive) were approved of without comment. On *R*, which makes specific recommendations regarding such manures as basic slag, the Special Committee recommend that the Board of Agriculture have power to bring within the scope of this clause such other new manures as the Board may think should be dealt with in the same way. Suggestions *S, T, U* were approved of. On *V*, which recommends identity of procedure in regard to analyses, the Committee approved of this, but recommended that further powers should be reserved to the Board of Agriculture, who should issue fuller definitions for the guidance of analysts. Further, in view of the increasing use of ground lime, the Science Committee recommended that this be included in the substances dealt with under the Act. The Committee further recommended that the Board of Agriculture should have power to from time to time bring other substances largely used by agriculturists, such as sulphate of copper, under the scope of the Act.

These suggestions were moved by Dr Wilson in name of the Committee.

Mr W. S. Ferguson moved an amendment, disapproving of the recommendation of the Departmental Committee empowering inspectors to take samples anywhere or at any time without the knowledge or consent of the buyer or seller. This was seconded by Mr Hutcheson, but, on a division being taken, only four voted for the amendment, the motion for the approval of the recommendations of the Science Committee being carried by a large majority.

Dairies, Cow-Sheds, and Milk-Shops Regulations.

The Special Committee appointed to consider and report on the Dairies, Cow-Sheds, and Milk-Shops Model Regulations, recently issued by the Local Government Board, submitted their report. The Committee were of opinion that the amount of air space per cow provided in No. 4 (600 to 800 cubic feet, with 50 square feet of floor space) is unnecessary from a sanitary point of view, and in many parts impracticable in successful dairying; they therefore recommended that with regard to air space in byres greater freedom of action be left with local authorities. The Committee were also of opinion that for double byres the minimum extent of floor space should be reduced from 50 to 40 square feet per cow. The Committee recommended the omission of the clause in No. 6, which provides that the trevasses in cow byres should be made of or covered with some impervious material. From No. 9 it was recommended that the clause requiring the dung-pit to be roofed in be omitted, the Committee being aware that in many situations and circumstances it is disadvantageous, both on sanitary and agricultural grounds, to have the dung-pit roofed. They were further of opinion that in several other respects the Regulations are not sufficiently elastic—that they do not leave local authorities with sufficient freedom of action in adapting their regulations to varying circumstances of the different parts of the country.

Mr Speir moved the adoption of this report, which was unanimously carried.

Lighting of Vehicles on Public Roads.

The Committee on this Bill was continued to watch over the interests of agriculturists in the matter.

MEETING OF DIRECTORS, 1st NOVEMBER 1905.

Present.—Vice-Presidents—Mr John Scott of Gala; Mr R. Shirra Gibb, Boon. *Ordinary Directors*—Mr James Stenhouse, Turnhouse; Mr Wm. Clark, Netherlea; Mr A. Hutcheson, Beechwood; Mr E. Douglas Paton, Broomhill; Mr Alexander M. Gordon of Newton; Mr Charles Howatson of Glenbuck; Mr John Murray, Munnieston; Sir Archibald Buchan Hepburn of Smeaton, Bart.; Mr John Marr, Uppermill; the Very Rev. John Gillespie, LL.D., Mouswald Manse; Mr Jonathan Middleton, Glastullich; Mr Wm. Taylor, Park Mains; Mr W. S. Ferguson, Pictstonhill; Mr Thomas Gordon Duff of Drummuir; David Wilson, D.Sc., of Carbeth; Mr

H. M. Leadbetter, Legerwood; Mr St Clair Cunningham, Hedderwick Hill; Mr Alexander Cross of Knockdon; Mr A. H. Anderson, Kippendavie; Mr William Duthie, Tarves; Mr C. M. Cameron, Balnakyle. *Extraordinary Directors*—Mr H. B. Marshall of Rachan; Mr M. G. Thorburn of Glenormiston; Mr Adam S. Logan, Ferney Castle; Mr George W. Constable, Traquair Estate Office; Mr John Oliver, Lynwood; Mr Andrew T. Elliot, Newhall; Mr John Wilson, Chapelhill; Mr James I. Davidson, Saughton Mains; Mr John Cran, Kirkton; Mr William T. Malcolm, Dunmore Home Farm; Captain Clayhills Henderson of Invergowrie, R.N. *Treasurer*—Sir James H. Gibson-Craig of Riccarton, Bart. *Honorary Secretary*—Sir John Gilmour of Montrave, Bart. *Chemist*—Mr James Hendrick, B.Sc., F.I.C. Mr A. M. Gordon, and afterwards Mr David Wilson, in the chair.

Chairman of the Board for 1905-1906.

On the motion of Sir JOHN GILMOUR, seconded by Sir JAMES H. GIBSON-CRAIG, Mr David Wilson of Carbeth, D.Sc., was unanimously elected Chairman of the Board for the ensuing year.

Dr WILSON thanked the Board for the honour conferred on him.

On the motion of Dr GILLESPIE, seconded by Mr GORDON, a cordial vote of thanks was passed to the Earl of Mansfield for his services to the Society as Chairman of the Board of Directors for the past two years.

Standing Committees.

The Standing Committees for the ensuing year were appointed, the names to be printed as usual in the Premium Book.

Representatives on other Bodies.

The following were appointed representatives of the Society on the Boards of Management of the undernoted institutions for the ensuing year—viz.: *West of Scotland Agricultural College*—Very Rev. John Gillespie, LL.D., Mouswald Manse, Ruthwell, R.S.O.; John M. Martin, Murieston House, Midcalder. *Edinburgh and East of Scotland College of Agriculture*—R. Shirra Gibb, Boon, Lauder; James Macdonald, Secretary. *Aberdeen and North of Scotland College of Agriculture*—T. Gordon Duff of Drummuir, Keith; William Duthie, Tarves. *Royal (Dick) Veterinary College*—John M. Martin, Midcalder.

Glasgow Show, 1905.

Accounts.—An Abstract of the Accounts of the Glasgow Show was submitted, showing a probable surplus of about £1200.

List of Awards.—The List of Awards was laid on the table.

Temperance Refreshment Booth.—The SECRETARY read a letter from Mrs Gourlay, Dowanhill Gardens, Glasgow, stating that from the surplus receipts drawn at the Temperance Refreshment Booth at the Glasgow Show a donation of £25 had been paid to the Royal Scottish Agricultural Benevolent Institution.

The CHAIRMAN said he was sure they would all be gratified by this announcement.

Glasgow Agricultural Society.—A letter was read from the Glasgow Agricultural Society asking for an allowance on account of the loss of rent sustained through the Highland Show being held in the Show-ground at Scotstoun.

The SECRETARY stated that this matter had been considered by the Shows Committee yesterday, when they unanimously resolved as follows: "In view of the facts that by the original arrangement between the two Societies no rent was to be asked for the ground, and that full regard was had to that consideration when the payments to be made to the Glasgow Agricultural Society were adjusted, the Committee could not see their way to recommend any addition to the sum of £450 already paid."

On the motion of Mr CROSS, seconded by Mr MIDDLETON, the recommendation of the Shows Committee was unanimously adopted.

Peebles Show, 1906.

Forage.—The Secretary was instructed to advertise for tenders for the supply of forage. The following Committee was appointed to consider the tenders and report to the Board—viz., Mr Malcolm (Convener), Mr M'Hutchen Dobbie, Mr Christie, Mr Ferguson, Mr Shirra Gibb, Mr John Wilson, Mr Constable, Mr St Clair Cunningham, Mr Ballantyne, jun., Mr Elliot, and Mr Clark.

Special Prizes.—The following Special Prizes were accepted, and votes of thanks accorded to the donors:—

1. Sir Walter Thorburn, M.P., Champion Bronze Medals for best Animal or Pen in each Section of Live Stock.

2. Shorthorn Society, two Champion Prizes of £25 each for the best male and the best female Shorthorn, open to all, entered or eligible for entry in Coates's Herd-Book.

3. Polled Cattle Society, Champion Gold Medal for the best breeding Animal of the Aberdeen-Angus Breed.

4. Sir John Gilmour of Montrave, Bart., £25 in Prizes for Yearlings by Thoroughbred Stallions, as at Glasgow.

5. Captain Clayhills Henderson of Invergowrie, R.N., £27 in Prizes for Hunter Brood Mares with foal at foot.

6. Hunter Improvement Society, Gold Medal for best Hunter Filly not exceeding three years old, as at Glasgow.

7. Hackney Horse Society, Gold Medal, value £10, for best Mare or Filly in the Hackney or Pony classes, on the same conditions as at Glasgow.

8. Society of Border-Leicester Sheep-Breeders, £10 for best pen of Border-Leicester sheep, as at Glasgow.

9. Mr E. Douglas Paton, Broomhill, £10 towards the prizes for pens of three Half-bred Ewe Lambs, it being understood that the Society will contribute an equal sum.

10. Charles Howatson of Glenbuck, £10 in prizes of £4, £3, £2, and £1, for pens of three Blackface Shearling Fat Wethers, it being understood that the animals are weighed after the awards are made, and the weights published in the Prize List.

Edinburgh Show, 1907.

Local Fund.—A letter was read from the County Clerk of Mid-Lothian intimating that his County Council had unanimously agreed to levy a voluntary assessment on owners of lands and heritages in aid of the funds of the Edinburgh Highland Show of 1907.

The Secretary was instructed to convey the cordial thanks of the Board to the Mid-Lothian County Council.

A letter was read from the County Clerk of West Lothian intimating that his County Council did not see their way to impose a voluntary assessment in aid of the funds of the Edinburgh Show.

Regret was expressed that the West Lothian County Council had not seen their way to a voluntary assessment.

Sir Archibald Buchan Hepburn intimated that the East Lothian County Council had unanimously resolved to raise a voluntary assessment, as was done for the Edinburgh Show of 1899.

Showyard Contractor.

It was reported that Messrs D. MacAndrew & Co., 120 Loch Street, Aberdeen, had been appointed Showyard Contractors to the Society in room of the late Mr James Farquhar.

Over-Dressing of Barley.

A meeting of the Joint-Committee was held on 21st July and considered the leaflet prepared by the Board of Agriculture. This leaflet was revised and circulated widely amongst barley-growers in Scotland. At a meeting of Committee held the previous day the representatives of the brewers and maltsters reported that a very considerable improvement had taken place in the threshing of the barley this autumn, and it was agreed that trials of threshing-machines should be delayed. At the same time samples of barley were submitted, the price of which was reduced by 4s. per quarter on account of careless dressing.

Government Aid for Educational and Scientific Work.

A letter was submitted from the Royal Agricultural Society of England stating that the Council of that Society had resolved to make application to the Board of Agriculture for a Government grant in aid of the education and scientific branches of the Society's work.

Dr GILLESPIE expressed the opinion that this Society should join with the Royal Agricultural Society of England in making this application for a Government grant, particularly in aid of the expenses of conducting the examinations for the National Diplomas in Agriculture and Dairying. He moved that power be given to the Society's representatives on the National Agricultural Examination Board to co-operate with the Royal Agricultural Society in such manner as they may think desirable.

The CHAIRMAN seconded, and the motion was unanimously agreed to.

MEETING OF DIRECTORS, 6TH DECEMBER 1905.

Present.—Vice-President—Mr R. Shirra Gibb, Boon. *Ordinary Directors*—Mr James Stenhouse, Turnhouse; Mr William Clark, Netherlea; Mr J. Ernest Kerr, Harviestoun Castle; Mr E. Douglas Paton, Broomhill; Mr Charles Howatson of Glenbuck; Sir Archibald Buchan Hepburn of Smeaton, Bart.; Mr John Marr, Uppermill; Mr John M'Hutchen Dobbie, Campend; Mr David Wilson, D.Sc.; Mr St Clair Cunningham, Hedderwick Hill; Mr Alexander Cross of Knockdon; Mr A. H. Anderson, Kippendavie; Mr John M'Caig, Challoch. *Extraordinary Directors*—Mr James A. W. Mein, Hunthill; Mr Adam S. Logan, Ferney Castle; Mr George W. Constable, Traquair Estate Office; Mr Andrew T. Elliot, Newhall; Mr John Ballingall, Dunbog; Mr F. W. Christie, Dairsie Mains; Mr John Wilson, Edinburgh; Mr James I. Davidson, Saughton Mains; Mr John Cran, Kirkton; Captain G. D. Clayhills Henderson of Invergowrie, R.N. *Treasurer*—Sir James H. Gibson-Craig of Riccarton, Bart. Mr David Wilson in the Chair.

The late Lochiel.

The CHAIRMAN, before beginning the business of the meeting, referred in suitable terms to the loss sustained by the Society by the death of Lochiel, who had been a Member for forty-six years, a Director since 1883, Vice-President in 1892, and President in 1901, when the Show was held at Inverness.

Peebles Show, 1906.

Prize List.—The reports of the Shows Committee on the prize list for the Peebles Show were adopted.

It was resolved that the rule as to calving be altered to require the birth of a live or "full-time" calf. A sum of £20 was added to the prize money for Shetland ponies.

Special Prizes.—The following special prizes were accepted, and votes of thanks accorded to the donors:—

1. By the Polo and Riding Pony Society, £15 to be applied in increasing the first prize in each of the three classes for Highland ponies to £10.
2. By Mr M. G. Thorburn of Glenormiston, £50, divided as follows: £40 towards the prizes for Cheviot sheep; £10 for prizes of £5, £3, and £2 for pens of Cross-bred lambs in Class 113, got by Border-Leicester tups out of Blackface ewes.
3. By Peebles Co-operative Society, Limited, piece of plate, value £10, for best pen of Half-bred sheep.

Mr Howatson's Prizes.—The SECRETARY stated that Mr Howatson of Glenbuck, who had to leave the meeting, desired the permission of the Board to withdraw the £10 he had offered as prizes for Blackfaced wethers, and to offer the money as a Champion Prize for the best Blackfaced tup of any age exhibited in the ordinary classes.

This was agreed to.

Edinburgh Show, 1907.

Local Fund.—A letter was read from the County Clerk of East Lothian intimating that his County Council had resolved to levy a voluntary assessment next year in aid of the expenses of the Edinburgh Highland Show of 1907, on the same lines as for the Show of 1899.

The Secretary was instructed to convey the thanks of the Society to the East Lothian County Council.

Implement Department of the Society's Annual Show.—The following Resolution was unanimously adopted: "Remit to a Committee to consider and report as to steps to be taken to limit the area of ground allotted to the Implement Department of the Society's Annual Show."

The Committee was appointed as follows: The Chairman of the Board, the Treasurer, Honorary Secretary, Convener of Shows Committee, and the Stewards.

Royal Commission on Motor Cars.

Letters were read from the Secretary of the Royal Commission on Motor Cars, inviting the Society to appoint a witness to give evidence before the Commission.

On the motion of Mr ANDERSON, seconded by Mr DAVIDSON, Mr John Marr, Uppermill, was appointed to give evidence before the Commission, it being understood that, upon hearing that the Commission would receive the Society's witness, Mr Marr would prepare and forward to the Secretary of the Commission a summary of the evidence he would submit.

Milk Records.

On the recommendation of the Special Committee it was resolved to continue the Milk Records Scheme for 1906.

Sinclair Scott Trophy.

The SECRETARY reported that the 100 Guinea Challenge Trophy, which the late Mr R. Sinclair Scott had offered for the best group of Blackfaced sheep at the Highland Show, had not been prepared before Mr Scott's death. Mr Scott's Trustees had sent him a cheque for the 100 guineas, with a request that a suitable Trophy be obtained and competed for in accordance with the rules contained in Mr Scott's offer as printed in the prize list for the Glasgow Show of this year. The Trustees expressed the hope that the Society would undertake to provide the Medal which Mr Scott was to have given annually until the Trophy would be won outright.

It was agreed that the Society's Silver Medal be given annually to the winner in place of the Medal offered by Mr Sinclair Scott.

Instructions were given to the Secretary as to the preparation of the Trophy.

MEETING OF DIRECTORS, 10TH JANUARY 1906.

Present.—Vice-President—Mr R. Shirra Gibb, Boon. *Ordinary Directors*—Mr James Stenhouse, Turnhouse; Mr William Clark, Netherlea; Mr J. Ernest Kerr of Harviestoun Castle; Mr A. Hutcheson, Beechwood; Mr E. Douglas Paton, Broomhill; Mr Alex. M. Gordon of Newton; Mr Charles Howatson of Glenbuck; Mr John Murray, Munnieston; Sir Arch. Buchan Hepburn of Smeaton, Bart.; Mr John Marr, Uppermill; Very Rev. John Gillespie, LL.D., Mouswald Manse; Mr C. H. Scott Plummer of Sunderland Hall; Mr John M'Hutchen Dobbie, Campend; Mr William Taylor, Park Mains; Mr David Wilson, D.Sc., of Carbeth; Mr Thomas Gordon Duff of Drummuir; Mr John Macpherson Grant, yr. of Ballindalloch; Mr H. M. Leadbetter, Legerwood; Mr St Clair Cunningham, Hedderwick Hill; Mr Alex. Cross of Knockdon; Mr A. H. Anderson, Kippendavie Estate Office; Right Hon. the Earl of Mansfield, Scone Palace; Mr Wm. Duthie, Tarves; and Mr C. M. Cameron, Balnakyle. *Extraordinary Directors*—Colonel Charles Hope of Cowdenknowes; Mr H. B. Marshall of Rachan; Mr John Oliver, Lynwood; Mr Andrew T. Elliot, Newhall; Mr Robert Paterson, Hill of Drip; Mr John Ballingall, Dunbog; Mr F. W. Christie, Dairsie Mains; Mr John Wilson, Chapelhill; Mr Andrew Ralston, Glamis; Mr John M. Aitken, Norwood; Mr James I. Davidson, Saughton Mains; Mr John Cran, Kirkton; and Mr William T. Malcolm, Dunmore. *Treasurer*—Sir James H. Gibson-Craig of Riccarton, Bart. *Hon. Secretary*—Sir John Gilmour of Montrave, Bart. *Chemist*—Mr James Hendrick, B.Sc., F.I.C. *Auditor*—Mr William Home Cook, C.A. Mr David Wilson, D.Sc., of Carbeth, in the chair.

Finance.

The report of the Finance Committee was submitted, showing that the accounts for 1904-5, and the estimate for 1905-6, had been submitted.

Peebles Show, 1906.

Forage.—The offer of Mr B. Tudhope, Milkieston, Eddleston, to supply forage for the Peebles Show was accepted.

Stewards.—The Stewards of the various departments were reappointed as follows: Cattle, Very Rev. Dr Gillespie; horses, Mr W. S. Ferguson, Pictstonhill; sheep, swine, &c., Mr John Wilson, Edinburgh; forage, Mr W. T. Malcolm, Dunmore Home Farm; parade stands, Mr St Clair Cunningham, Hedderwick Hill; gates, Mr M'Hutchen Dobbie, Campend; implements, Mr Jonathan Middleton.

Catering.—It was resolved that there be five ordinary licensed Refreshment Booths and a Tea Pavilion, the Caterers in these to be—James Hay, Union Buildings, Aberdeen (Committee Booth); John Brodie, Cross Keys Hotel, Dalkeith; White & Smith, 7 & 9 Gordon Street, Glasgow; J. M'Cracken, Victoria Hotel, Princes Street, Perth; P. MacSorley, 7 Ann Street, Glasgow; and Tea Pavilion—The Peebles Branch of the British Women's Temperance Association (per Miss M. Weatherston, 27 High Street, Peebles).

Special Prizes.—The following Special Prizes were accepted, and votes of thanks accorded to the donors:—

1. By the Clydesdale Horse Society, the Cawdor Challenge Cup, for best Mare or Filly, as at Glasgow Show, 1905.
2. By the Suffolk Sheep Society, £30 in Special Prizes as at Glasgow Show, 1905, for Suffolk Sheep and Suffolk Crosses.
3. By the Shropshire Sheep-Breeders' Association, £10 in prizes for pens of three Cross-bred Lambs, sired by a pure-bred Shropshire Ram.

Swine Classes.—The following alterations were adopted in the classes for Swine: (1) That the three classes for pigs of the "White Breed other than Large" be omitted; (2) that the class of "Three Large White Pigs not above eight months old" be divided into two classes,—the one for "Pair Large White Boars not above eight months old," and the other for "Pair Large White Gelts not above eight months old," each class with prizes of £5, £3, and £2; and (3) that the class for "Three Berkshire Pigs not above eight months old" be similarly divided.

Forestry Exhibition.—It was resolved to grant the use of space in the Showyard, free of charge, to the Royal Scottish Arboricultural Society for an exhibition of Forestry on the same lines as at recent Shows. It was also resolved to grant a sum of £20 to that Society for prizes for timber at the Forestry Exhibition on the same conditions as last year, the timber to be grown in any part of the United Kingdom.

Aberdeen Show, 1908.

The CHAIRMAN moved as follows: "That provided a suitable site is available and satisfactory financial and other arrangements can be made, the Society's Show of 1908 be held in the Aberdeen district."

Mr CRAN seconded, and the motion was unanimously agreed to.

Burnt Ale.

The Board did not see its way to take any action as to a suggestion that experiments be undertaken for testing the manurial value of "burnt ale" and other distillery by-products when applied to farm crops.

Kilmarnock Dairy School.

It was agreed to recommend the renewal for the current year of the grant of £100 to the Kilmarnock Dairy School.

Forestry.

It was resolved to recommend the renewal for the current year of the grant of £50 to the Lecturer on Forestry in the University of Edinburgh.

Royal Commission on Motor Cars.

The Secretary read a letter from the Secretary of the Royal Commission on Motor Cars, stating that the Commission adhered to its decision that before considering whether or not it would receive a witness appointed by this Society it must first have before it the heads of the evidence that would be given by that witness.

On the motion of Dr GILLESPIE, seconded by Mr GORDON of Newton, the following resolution was unanimously adopted: "Having learned with much surprise that the Royal Commission on Motor Cars propose to adopt the unusual and extraordinary course of declining to decide whether or not they will receive a witness from this Society until they have first seen the heads of the evidence he would give, the Highland and Agricultural Society of Scotland, as the Society which represents the agriculture of Scotland generally, respectfully demands that a witness appointed by the Society be given a hearing by the Royal Commission on Motor Cars without the unusual condition proposed by the Commission."

Appointment of Judges.

The Judges for the Peebles Show were appointed in Committee.

PROCEEDINGS AT GENERAL MEETINGS.

GENERAL MEETING, 7TH JUNE 1905.

Mr A. M. GORDON of Newton in the Chair.

New Members.

268 candidates were balloted for and admitted as members.

Office-Bearers.

The SECRETARY submitted the following list of office-bearers, as recommended by the Directors:—

President—Sir Walter Thorburn, M.P. *Vice-Presidents*—Lord Dunglass; Sir Duncan E. Hay of Haystoun, Bart.; John Scott of Gala; R. Shirra Gibb, Boon. *Ordinary Directors*—St Clair Cunningham, Hedderwick Hill; Alex. Cross of Knockdon; A. H. Anderson, Kippendavie; John M'Caig, Challoch; Earl of Mansfield, Scone Palace; C. J. Cunningham of Wooden; William Duthie, Tarves; C. M. Cameron, Balnakyle. *Extraordinary Directors*—Colonel Chas. Hope of Cowdenknowes; H. B. Marshall of Rachan; James A. W. Mein of Hunthill; Athole S. Hay of Marlfield; M. G. Thorburn of Glenormiston; Adam S. Logan, Ferney Castle; George W. Constable, Traquair Estate Office; John Oliver, Lynwood; A. T. Elliot, Newhall; H. Ballantyne, jun., Provost of Peebles; Robt. Paterson, Hill of Drip; John Ballingall, Dunbog; F. W. Christie, Dairsie Mains; John Wilson, Chapelhill, Edinburgh; Andrew Ralston, Glamis; John M. Aitken, Norwood; James I. Davidson, Saughton Mains; John Cran, Kirkton; W. T. Malcolm, Dunmore; Captain Clayhills Henderson of Invergowrie, R.N.

Glasgow Show, 1905.

Mr CROSS of Knockdon, Convener of the Local Committee, reported that the arrangements are well advanced for the Show to be held at Glasgow on the 4th of July and three following days. The Show will take place in the Show-ground of the Glasgow Agricultural Society at Scotstoun, in connection with which there are excellent railway and tramway facilities. The Corporation of Glasgow had granted a supply of water free of charge, and voted a sum of £250 in aid of the funds of the Show. The County Councils of Lanark, Ayr, Renfrew, and Bute had been good enough to levy a voluntary assessment in support of the Show, and the Commissioners of Supply for Argyllshire had taken the trouble of raising a contribution from that county by private subscriptions.

Border Show, 1906.

Mr R. SHIRRA GIBB reported that for the Show of 1906, to be held at Peebles, all the County Councils in the Border Show district had now agreed to levy a voluntary assessment in aid of the Show, while the town and county of Peebles had raised a handsome additional fund, besides providing an excellent site close to the town.

Edinburgh Show, 1907.

It was reported that a committee of local Directors had been appointed to arrange for a site for the Show of 1907, to be held at Edinburgh.

Education.

Mr **John Speir** reported on the results of the recent examinations for the National Diploma in Agriculture and the Society's Certificate in Forestry. He thought it worthy of note that of the eleven students from Scotland who sat in the first division of the N.D.A. examination, recently held at Leeds, only one had failed to satisfy the examiners; and that of the four who entered the final division every one had been successful, one of them carrying off the "gold medal for the best student in the honours list." The whole of the four Scotch students who obtained the diploma, as well as six of the ten Scotch students who were successful in the first division, had received their scientific and technical training in the West of Scotland College of Agriculture. The other four successful Scotch students in Part I. were from the Aberdeen and North of Scotland College of Agriculture. Another feature in connection with the examination for the National Diploma in Agriculture was the very large number of students sent forward by the leading agricultural colleges in England, Wales, and Ireland. A more thoroughly representative gathering of the agricultural students of these countries could hardly be conceived, showing conclusively that this examination is fulfilling a function of real value in the furtherance of agricultural education in the United Kingdom. With regard to the examination for the Society's certificates in forestry, he remarked that the Directors felt the increasing importance attached to the question of forestry education in this country, and it was their desire that the Society's examination should be conducted so as to render it of the greatest service possible in promoting this useful work. By moderate degrees the standard of the examination had been raised, and, with the view of encouraging students to come forward, it was resolved to resume the holding of the examination every year. The examination held by the Society last April had shown clearly that while gratifying progress had been made in providing technical and scientific instruction for students of forestry in Scotland, there was still room for improvement—he might say even an urgent need for improvement. This was the case in particular with regard to the central subject of forestry—the practical management of woods and the utilisation of their produce. The lectureships which did exist in the University of Edinburgh and elsewhere were good as far as they went, and they were grateful for them. Something more, however, was wanted, and was now urgently asked for. Those lectureships must be extended so as to cover, in a thoroughly efficient manner, all departments, even all nooks and corners of the work of the forester. Then, above all, they felt the want of object-lessons for students of forestry. There was a pressing need for educational forest areas—some of them might be mere plots, some of them should be of considerable extent. It was hoped they would not have long to wait for progress in these directions.

Science Department.

Dr **Wilson** of Carbeth reported on the work carried on under the care of the Science Committee. The experiments upon the improvement of upland pastures, undertaken in conjunction with the Board of Agriculture, have now entered upon their fifth year. The results obtained in the first four years are reported upon in the recently issued volume of 'Transactions,' that report embracing also the results of experiments on the same lines conducted in the south-west by the West of Scotland Agricultural College. In this preliminary report no attempt is made to draw definite conclusions. It is shown, however, that while the results are interesting and suggestive at several points, they are, on the whole, very disappointing compared with those obtained during the first three years of the similar experiment at Cockle Park, Northumberland. The milk record scheme again brought out most useful lessons in its second year, and it is being carried out this year on similar lines in two centres in the county of Ayr, the tests continuing for a longer period than in the past two years. For some time the Directors have been in correspondence with the Board of Agriculture, with the view of inducing the Board of Agriculture to undertake an exhaustive investigation regarding abortion amongst cows. This the Board has now seen its way to undertake, and the Directors hope they will have the cordial approval of the entire body of members in offering the Board of Agriculture the hearty co-operation and support of this Society in carrying that investigation to a successful issue. At their meeting on the 3rd May the Directors unanimously adopted a resolution to the effect that, subject to the approval of this general meeting, power be given to the Science Committee to contribute to the costs of the abortion investigation up to a sum not exceeding £500, provided it should be found that the funds granted by the Treasury are insufficient to enable the Departmental Committee to satisfactorily complete the inquiries. He moved approval of that resolution.

This was agreed to.

Botanical Report.

The Secretary read the following report by the Society's botanist, Professor M'Alpine: I have the honour to report that during this season over two hundred samples of grass, clover, and other seeds were sent in for testing. Very few samples of chicory, yarrow, burnet, and kidney vetch were received. One sample of Italian ryegrass was sent in, which failed to germinate even 1 per cent. The purity of the samples was usually very high. The following table shows the maximum and minimum germination:—

	Max. germ.	Min. germ.
Clovers—		
Red	99	90
Alsyke	97	84
White	99	79
Trefoil	100	92
Grasses—		
Perennial ryegrass	99	79
Italian ryegrass	100	82 & 0
Timothy	100	90
Cocksfoot	98	75
Meadow fescue	99	90
Tall fescue	97	85
Hard fescue	98	85
Meadow foxtail	92	69
Crested dogstail	94	81
Rough-stalked meadow grass	96	90

GENERAL MEETING IN THE SHOWYARD AT GLASGOW,
5TH JULY 1905.

The Earl of Eglinton and Winton, President of the Society, occupied the chair.

The Earl of Mansfield moved that the cordial thanks of the Society be given to Lord Provost Sir John Ure Primrose and the Magistrates and Town Council of Glasgow for their assistance and co-operation in furthering the success of the Show, for the handsome contribution of £250 by the city of Glasgow, and for a supply of water free of charge. He need hardly say that they were all very thankful to them for the great efforts they had made to help them in that their annual Show. They were very grateful to them for their handsome donation, and for a free supply of water.

Mr A. M. Gordon, Newton, seconded the motion, which was adopted.

Sir John Gilmour moved that the cordial thanks of the Society be given to the subscribers to the funds in aid of the Show, and to the donors of special prizes for the liberal support they had given to the Society. When he told them that the County Council of Lanark had given the very handsome gift of £503, the county of Ayr £501, the county of Renfrew £150, the Commissioners of Supply of the county of Argyll £112, and the city of Glasgow £250, he left the city to compare itself with some of these County Council efforts, when they were in the centre of the Western Metropolis. But, taking the Show as a whole, he thought it showed that their Society had the support of all classes.

Mr Andrew Hutcheson, Perth, seconded, and the motion was adopted.

The Rev. Dr Gillespie, Mouswald, moved that a hearty vote of thanks be given to Mr Cross of Knockdon, convener, and the other members of the Local Committee for the assistance rendered by them in carrying out the Show and promoting its success. They were specially indebted to Mr Cross. They all knew what an interest he took in every department of agriculture, and the prominent position he took in various phases of it, particularly in dairying.

Mr Wilson, Carbeth, seconded the resolution, which was agreed to.

Mr Cross briefly thanked the meeting.

The Appointment of Judges.

Mr R. Taylor, Pitlivie, moved, in accordance with notice, that the system of electing judges for the Highland Show be altered as follows:—

(1) That a full month before the meeting at which the judges are appointed the Secretary shall send to every one who has exhibited in the live stock section of

> the Show in any of the previous three years a schedule form, on which each exhibitor may nominate three persons as judges in each of the sections in which he had an entry.
>
> (2) That this list of nominations as made up by the Secretary to lay before the Directors shall show the number of nominations received by each person nominated, and that a copy of said list shall be furnished to every exhibitor who asks for same.
>
> (3) That from this list the parties—to the number of twice the number required as judges—shall be taken as a short leet, from which leet the final selection of the judges shall be made by the Directors.

Mr Taylor said the method by which the Directors had appointed judges in the past had not given general satisfaction to the exhibitors nor to the members of that great national Society. He understood that nomination forms were sent out to the various exhibitors in the different sections, and these nomination forms were returned to the Secretary; but the lists of nominations as made up to lay before the Directors did not show the number of nominations received by each party nominated. He thought they would agree with him that the exhibitors of live stock of any kind were surely the best judges of the best men to adjudicate their stock, and they would vote for the best men without fear or trembling. He wished to emphasise the fact that the final selection of judges was to be left in the hands of the Directors. It was not proposed to take anything out of their hands, and no reflection was being cast upon them.

Mr **Lee**, Congalton, seconded.

Sir **John Gilmour**, Bart. of Montrave, submitted the following amendment, which, as he said, incorporated a considerable part of Bailie Taylor's motion:—

> That a full month before the meeting at which the judges are appointed the Secretary shall send to every one who has exhibited in the live stock section of the Show in any of the previous three years a schedule form, on which each exhibitor may nominate three persons as judges in each of the sections in which he had an entry, and every third year the Breed Societies shall be invited to favour the Society with a list of qualified judges for the respective breeds, the number on the list to be twelve for each breed. The number of nominations received for each suggested judge shall be placed before the Board, and the nominations from Breed Societies shall be placed in a separate list. From the list of persons nominated by exhibitors and Breed Societies the Directors shall make the final appointment of judges and reserves by open voting in the usual manner. Nominations may also be made by Directors of persons not on the lists received from exhibitors and Breed Societies, provided they are supported by two-thirds of the Directors present.

In speaking to his motion Sir John said he had had some experience as a Director, and he had failed to find the great objections that were taken to the judges in the Highland yards. Speaking as an individual and not on behalf of the Board, he would say that while he was perfectly certain the Board was only too happy to have the opinion of all exhibitors on every matter—because it was on exhibitors that they must depend considerably for the success of the Show—if they on the Board were worthy of their places, and to deal with the affairs of that great Society, then they ought to be responsible for seeing that proper judges were appointed, just as they were responsible in other matters. While they would be very willing to receive all the opinions of those upon whom they depended, at the same time he held that they must keep the final selection in their own hands.

Mr **Alex. Glendinning** seconded.

No other members having risen, the Chairman asked Mr Taylor if he had anything to say in reply.

Mr **Taylor** said he did not see any great difference between his motion and the amendment. There was a little difference in the wording, but for the life of him he could not see why that great meeting should not accept his motion.

Mr **Alexander Guild**, W.S., Aberlady Mains, then rose to address the meeting, but the Chairman ruled that the debate was closed.

Mr **Biggar**, The Grange, Dalbeattie—May I ask Sir John Gilmour a question?

Sir **John Gilmour**—I understand from the Chairman that the debate is closed.

On a show of hands being taken the amendment was declared carried by a large majority.

Exhibitors in the Judging Rings.

On the motion of Mr **Merson**, Craigwillie, it was remitted to the Directors to consider the expediency of discontinuing the present custom of exhibitors leading their own stock in the judging rings.

The Board of Agriculture and the Society.

At the close of the business on the agenda,

Lord **Mansfield** rose to propose a vote of thanks to the President, Lord Eglinton, for presiding, and in doing so he mentioned that they had with them on the platform Sir Thomas Elliott, of the Board of Agriculture. He trusted the meeting would give him a proper Highland Agricultural greeting.

Sir **Thomas Elliott**, who was cordially received, said he regretted that the President of the Board of Agriculture had been prevented from being present. He was glad that the relations between the Board of Agriculture and the Highland Society were so good as they were. He had heard of a boy who was once asked for a definition of friendship, and the reply was—"A friend is one who knows all about you, but likes you just the same." That was just the sort of friendship that existed between the Board of Agriculture and the Highland Society. The Board knew all about the Highland Society, but they liked them just the same. He thought also that they of the Highland Society knew all about the Board, and that notwithstanding all the troubles about sheep dip also, they liked them just the same. Apropos of the sheep-dipping question, he wished to repeat what had been said to him by one of the wisest heads in Scotland, Mr James Macdonald, who had written to him saying, "Depend upon it, good will come out of it." That was just what they as a Board of Agriculture thought.

Lord **Eglinton** having expressed the hope that the Highland Society would do as much good in the future as in the past, the meeting ended.

GENERAL MEETING, 10th JANUARY 1906.

New Members.

169 candidates were duly balloted for and admitted as members.

Finance.

Sir **James H. Gibson-Craig**, honorary treasurer, laid on the table the volume of accounts for the year to 30th November 1905, as prepared by the Society's Auditor. Thanks to the handsome local fund of £1606, the Glasgow Show had left a credit balance of £1200. For the past year the Society's income, apart from the Show, was abnormally large. An exceptionally large number of new members had lately been elected, and as a result the receipts for members' subscriptions had reached £2203, which exceeded the average of the last five years by about £310, and which had only once been surpassed in the history of the Society—in 1899, when the sum was £2312. The income from invested funds was higher than in any former year, the amount last year being £3563. The gross outlay for the year was £12,571. The total receipts amounted to £14,985, leaving a balance of receipts of £2413. This included £1140 of life subscriptions, which sum is far from a profit, as it means the extinction of a corresponding amount of life subscriptions at a very low rate of composition. This balance also includes the surplus of the Glasgow local subscriptions over the actual deficiency of the Show, £1211,—so that the real balance of income over expenditure is only £62. This shows that the Board is using the means at its disposal, as far as is possible with prudence, in the promotion of the national agricultural interests. They ought always to bear in mind that it was necessary to have the support of local contributions. The fact of so small a proportion of life members' subscriptions being available for annual expenditure was not generally recognised.

Argyll Naval Fund.

Sir **John Gilmour** submitted the accounts of the Argyll Naval Fund for 1904-5, which showed that the income for the year amounted to £221, 19s. 4d., while the expenditure was £220—in grants of £40 each to five naval cadets, and a grant of £20 to one cadet. One vacancy occurred during the year in the list of beneficiaries by the promotion to the rank of lieutenant of Mr Evan Campbell Bunbury. From a list of several applicants the Directors, on the recommendation of the Committee, nominated to the vacancy Mr John A. Dalrymple Campbell, a distant relative of the late Admiral Campbell of Barbreck, Argyllshire.

Glasgow Show, 1905.

Mr **Cross** of Knockdon, convener of the Local Committee, reported on the Glasgow Show of last July. A heavy fall of rain on the forenoon of the second day told on the drawings for that day, and the attendance on the last day was smaller than had been expected. On the whole, however, the receipts for the Show were fairly satisfactory, so that, with a very handsome local fund, the Show leaves a credit balance of about £1200. To the local fund the landowners in the counties in the district contributed no less than £1356, while the city of Glasgow gave £250, with a supply of water free of charge.

Peebles Show, 1906.

Mr **Scott Plummer**, convener of the Local Committee, reported that arrangements are progressing for the Show to be held at Peebles on the 17th July next, and three following days. The premium list, which is in course of preparation, will be found to be on the same liberal scale as that for recent Highland Shows, and it is hoped that a creditable display of farm live stock will be brought out. The Show will be held in the Town Park and part of King's Meadows, and the site will be an excellent one. All the County Councils in the district have resolved to raise a voluntary assessment on owners of lands and heritages in support of the Show, while the town and business men of Peebles are to contribute liberally.

Edinburgh Show, 1907.

Sir **James Gibson-Craig**, convener of the Local Committee, reported that arrangements are being pushed forward for the Show of 1907, to be held in Edinburgh. The County Councils of Mid-Lothian and East Lothian had been good enough to agree to raise a voluntary assessment from owners of lands and heritages in support of the Show, as was done for former Shows. The County Council of West Lothian had, unfortunately, not seen their way to agree to a voluntary assessment, but it was hoped that county would contribute by some other method.

Aberdeen Show, 1908.

Mr **A. M. Gordon** moved that, provided a suitable site is available, and satisfactory financial and other arrangements can be made, the Show of 1908 be held in the Aberdeen district. Mr Gordon further said that they proposed to visit Aberdeen under the new circuit two years before they were due there, but he was quite sure Aberdeen would do its best to guarantee them a hearty welcome, and to further the interests of the Society in every possible way.

Mr **Wm. Duthie**, Collynie, seconded, and the motion was unanimously agreed to.

Veterinary Education.

Dr **Gillespie** moved as follows: "Having regard to the importance of veterinary education and research, and to the fact that subsidies from the National Exchequer are now given for these objects in England and Ireland, the members of the Highland and Agricultural Society, in general meeting assembled, resolve to make application for an annual grant from Imperial funds towards veterinary education and research in Scotland." In supporting his motion, the Doctor said he had no need to insist upon the importance of veterinary education, but there was some need to insist upon the importance of research, because the prevention of disease was fully as important as its cure. Except they were disposed to be philanthropical, the existing veterinary colleges had no means for carrying on research; therefore they proposed to make application for a grant from the national funds. The Royal Veterinary College in London had, he understood, been assured of a grant of £800 per annum. Large sums had been given for the endowment of veterinary education in Ireland, beginning with a grant of £15,000 from the Exchequer, and since supplemented by a grant of £5000 from the Department of Agriculture. Scotland did not ask a sum of that kind, but it did ask that a grant should be given. It was sometimes said that matters of this kind should be left to the Scotch members of Parliament. With the utmost respect for those gentlemen personally, Dr Gillespie said he had very little faith in them as suppliants for patriotic purposes. His ideal member of Parliament was a good average between the Irish type, who was always asking for something, and the Scotch type, who never asked for anything.

Mr **John M. Martin** seconded the motion, which was unanimously agreed to.

District Shows and Competitions.

Mr **John Marr** submitted the report on district shows and competitions, showing that in 1905 grants of money and medals have been given in 334 districts. The total expenditure under this head amounted to £669. For the current year the Directors proposed the following grants: (1) Under section one, twenty districts for grants of £12 each for cattle, horses, and sheep, and eighteen districts in intermediate competition with a grant of three silver medals to each. (2) Under section two, sixteen districts for grants of £15 each for stallions. Special grants of £40 for Highland home industries; £20 to Kilmarnock Cheese Show; £12 and two minor silver medals to the Island of Eday; £5 to Shetland; and £3 each to West Mainland, Rousay, and South Ronaldshay and Burray in Orkney. Thirteen districts for two medals each. About 150 medals at ploughing competitions; two medals each to fifteen districts for cottages and gardens,—making the total sum offered in 1906, £678.

Mr **John M. Aitken** seconded, and the motion was unanimously agreed to.

Chemical and Botanical.

Dr **Wilson** of Carbeth, convener, reported on behalf of the Science Committee. Arrangements were made for continuing for another year the experiments being conducted at Sunderland Hall, Boon, and Naemoor, with the view of testing the effects of certain manures and feeding-stuffs in the improvement of permanent upland pasture, the condition of the sheep being taken as the measure of the improvement. The results of the first four years of these experiments were reported upon in last year's volume of the Society's 'Transactions.' The question of damage among sheep by the "fly" is under consideration by the Science Committee. Extensive investigations are being conducted by the Society's entomologist, Dr R. Stewart MacDougall, and it is hoped information may be obtained that will be helpful to flockowners in protecting their stock from this plague. Fecundity in sheep is the subject of another inquiry, which it is hoped may be useful to owners of breeding sheep. Among other points being investigated is the extent to which the numbers of twin lambs may be influenced by methods of feeding and management.

Forestry.

The **Earl of Mansfield** moved that the annual grant of £50 to the lectureship on forestry in the University of Edinburgh be continued for the current year. He reported that the next examination for the Society's certificate in forestry would take place in the Society's Chambers on Tuesday, Wednesday, and Thursday, the 10th, 11th, and 12th of April, entries closing on 10th March.

Sir **Archd. Buchan Hepburn** seconded, and the motion was agreed to.

Education.

Rev. Dr **Gillespie** reported the results of the examinations held at Reading and Kilmarnock last autumn for the National Diploma in Dairying. At Reading there were 36 candidates, of whom 14 obtained the diploma; at Kilmarnock 25 candidates, of whom 17 obtained the diploma. The names of the successful candidates at these examinations, as well as at the examination for the National Diploma in Agriculture held at Leeds last May, will be published in the forthcoming volume of 'Transactions.' He moved that the annual grant of £100 to Kilmarnock Dairy School be continued for the current year. Dr Gillespie further mentioned that there was every likelihood of the Government authorities taking over the arrangements for examining and granting the degrees of N.D.D. and N.D.A. Everybody would be satisfied with this arrangement, as the national Societies had simply stepped in to do this work at a time when the Government authorities did not see their way to take it up.

Publications.

Rev. Dr **Gillespie** reported that the Publications Committee had completed arrangements for papers for the volume of 'Transactions' to be issued in the coming spring.

Mr **Howatson** having moved a vote of thanks to the Chairman, the meeting separated.

APPENDIX

PREMIUMS

OFFERED BY

THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND IN 1906

CONTENTS.

PAGE
General Notice 3
Constitution and Management 3
Privileges of Members 4
Establishment for 1905-1906 5
Committees for 1905-1906 7
Meetings for 1906 10
Examinations for 1906 11
Agricultural Education 12
Veterinary Department 20
Forestry Department 20
Dairy Department 27
Chemical Department 32
Botanical Department 39
General Regulations for Competitors 41

CLASS I.—REPORTS.

1. The Science and Practice of Agriculture—For Approved Reports on—

1. Rural Economy abroad susceptible of being introduced into Scotland 42
2. Other suitable subjects 42

2. Estate Improvements—For Approved Reports on—

1. General Improvement of Estates by Proprietors . . 42
2, 3, and 4. Reclamation of Waste Land by Proprietors or Tenants 42
5 and 6. Improvement of Natural Pasture by Proprietors or Tenants 43

3. Highland Industries and Fisheries—For Approved Reports on—

1. Mode of treating Native Wool 43
4. Machinery—For Approved Reports 43

5. Forestry Department—For Approved Reports on—
    1. Planting on Peat-bog 44

CLASS II.—DISTRICT COMPETITIONS.

1. Stock 44
2. Special Grants 50
3. Medals in aid of Premiums given by Local Societies . . 51
4. Ploughing Competitions 53

CLASS III.—COTTAGES AND GARDENS.

1. Premiums for Best Kept Cottages and Gardens . . 54
2. Medals for Cottages and Gardens or Garden Produce and Bee-Keeping 55

GENERAL SHOW AT PEEBLES IN 1906. . . . 57

GENERAL SHOW AT EDINBURGH IN 1907 . . . 84

LIST OF MEMBERS ADMITTED IN JUNE 1905 AND JANUARY 1906 85

GENERAL NOTICE.

THE HIGHLAND SOCIETY was instituted in the year 1784, and incorporated by Royal Charter in 1787. Its operation was at first limited to matters connected with the improvement of the Highlands of Scotland; but the supervision of certain departments, proper to that part of the country, having been subsequently committed to special Boards of Management, several of the earlier objects contemplated by the Society were abandoned, while the progress of agriculture led to the adoption of others of a more general character. The exertions of the Society were thus early extended to the whole of Scotland, and have since been continuously directed to the promotion of the science and practice of agriculture in all its branches.

In accordance with this more enlarged sphere of action, the original title of the Society was altered, under a Royal Charter, in 1834, to THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND.

Among the more important measures which have been effected by the Society are—

1. Agricultural Meetings and General Shows of Stock, Implements, &c., held in the principal towns of Scotland, at which exhibitors from all parts of the United Kingdom are allowed to compete.

2. A system of District Shows instituted for the purpose of improving the breeds of Stock most suitable for different parts of the country, and of aiding and directing the efforts of Local Agricultural Associations.

3. The encouragement of Agricultural Education, under powers conferred by a supplementary Royal Charter, granted in 1856, and authorising the Society to grant Diplomas to Students of Agriculture; and by giving grants in aid of education in Agriculture and allied sciences. In 1900 the Society discontinued its own Examination, and instituted jointly with the Royal Agricultural Society of England an Examination for a National Diploma in Agriculture.

4. The advancement of the Veterinary Art, by conferring Certificates on Students who have passed through a prescribed curriculum, and who are found, by public examination, qualified to practise. Terminated in 1881 in accordance with arrangements with the Royal College of Veterinary Surgeons.

5. The institution of a National Examination in Dairying, jointly with the Royal Agricultural Society of England.

6. The institution of an Examination in Forestry for First and Second Class Certificates.

7. The appointment of a chemist for the purpose of promoting the application of science to agriculture.

8. The establishment of a Botanical Department.

9. The appointment of Entomologist to advise members regarding insect pests.

10. The annual publication of the 'Transactions,' comprehending papers by selected writers, Prize Reports, and reports of experiments, also an abstract of the business at Board and General Meetings, and other communications.

11. The management of a fund left by John, 5th Duke of Argyll (the original President of the Society), to assist young natives of the Highlands who enter His Majesty's Navy.

CONSTITUTION AND MANAGEMENT.

The general business of THE HIGHLAND AND AGRICULTURAL SOCIETY is conducted under the sanction and control of the Royal Charters, referred to above, which authorise the enactment of Bye-Laws.

The Office-Bearers consist of a President, Four Vice-Presidents, Thirty-two Ordinary and Twenty Extraordinary Directors, a Treasurer, an Honorary and an Acting Secretary, an Auditor, and other Officers.

The Supplementary Charter of 1856 provides for the appointment of a Council on Education, consisting of Sixteen Members — Nine nominated by the Charter, and Seven elected by the Society.

PRIVILEGES OF MEMBERS

MEMBERS OF THE SOCIETY ARE ENTITLED—

1. *To receive a free copy of the 'Transactions' annually.*
2. *To apply for District Premiums that may be offered.*
3. *To report Ploughing Matches for Medals that may be offered.*
4. *To Free Admission to the Shows of the Society.*
5. *To exhibit Live Stock and Implements at reduced rates.*[1]
6. *To have Manures and Feeding-Stuffs analysed at reduced fees.*
7. *To have Seeds tested at reduced fees.*
8. *To have Insect Pests and Diseases affecting Farm Crops inquired into.*
9. *To attend and vote at General Meetings of the Society.*
10. *To vote for the Election of Directors, &c., &c.*

ANALYSIS OF MANURES AND FEEDING-STUFFS

The Fees of the Society's Chemist for Analyses made for Members of the Society shall, until further notice, be as follow:—

The estimation of *one* ingredient in a manure or feeding-stuff	5s.
The estimation of *two or more* ingredients in a manure or feeding-stuff . . .	10s.

These charges apply only to analyses made for the sole and private use of Members of the Highland and Agricultural Society who are not engaged in the manufacture or sale of the substances analysed.

The Society's Chemist, if requested, also supplies valuations of manures, according to the Society's scale of units.

SEEDS, CROP DISEASES, INSECT PESTS, &c.

The rates of charges for the examination of plants and seeds, crop diseases, insect pests, &c., will be had on application to the Secretary.

ELECTION OF MEMBERS

Candidates for admission to the Society must be proposed by a Member, and are elected at the half-yearly General Meetings in January and June. It is not necessary that the proposer should attend the Meeting.

CONDITIONS OF MEMBERSHIP

The ordinary annual subscription is £1, 3s. 6d., and the ordinary subscription for life-membership is £12, 12s.; or after ten annual payments have been made, £7, 7s. Proprietors farming the whole of their own lands, whose rental on the Valuation Roll does not exceed £500 per annum, and all Tenant-Farmers, Secretaries or Treasurers of Local Agricultural Associations, Factors resident on Estates, Land Stewards, Foresters, Agricultural Implement Makers, and Veterinary Surgeons, none of them being also owners of land to an extent exceeding £500 per annum, are admitted on a subscription of 10s. annually, which may be redeemed by one payment of £5, 5s., or, after ten annual payments have been made, by one payment of £3, 3s.[2] Subscriptions are payable on election, and afterwards annually in January.

Members are requested to send to the Secretary the names and addresses of Candidates they have to propose (stating whether the Candidates should be on the £1, 3s. 6d. or 10s. list).

JAMES MACDONALD, *Secretary.*

3 GEORGE IV. BRIDGE, EDINBURGH.

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[1] Firms are not admitted as Members; but if one partner of a firm becomes a Member, the firm is allowed to exhibit at Members' rates.

[2] Candidates claiming to be on the 10s. list must state under which of the above designations they are entitled to be placed on it.

ESTABLISHMENT FOR 1905-1906

President.

SIR WALTER THORBURN OF GLENBRECK, KERFIELD, PEEBLES.

Vice-Presidents.

Lord DUNGLASS, Springfield House, Coldstream.
Sir DUNCAN E. HAY of Haystoun, Bart., Kingsmeadows, Peebles.
JOHN SCOTT of Gala, Galashiels.
R. SHIRRA GIBB, Boon, Lauder.

Ordinary Directors.

Year of Election.	
1902	JAMES STENHOUSE, Turnhouse, Cramond Bridge.
	WILLIAM CLARK, Netherlea Farm, Cathcart.
	J. ERNEST KERR, Harviestoun Castle, Dollar.
	ANDREW HUTCHESON, Beechwood, Perth.
	E. DOUGLAS PATON, Broomhill, Melrose.
	Sir R. W. BUCHANAN-JARDINE of Castlemilk, Bart., Lockerbie.
	ALEXANDER M. GORDON of Newton, Insch, Aberdeenshire.
	J. DOUGLAS FLETCHER of Rosehaugh, Avoch, R.S.O., Ross-shire.
1903	CHARLES HOWATSON of Glenbuck.
	Sir ROBERT D. MONCREIFFE of Moncreiffe, Bart., Bridge of Earn.
	JOHN MURRAY, Munnieston, Kippen Station, Stirling.
	Sir ARCHIBALD BUCHAN HEPBURN of Smeaton, Bart., Prestonkirk.
	JOHN MARR, Upper Mill, Tarves.
	Very Rev. JOHN GILLESPIE, LL.D., Mouswald Manse, Ruthwell, R.S.O
	JONATHAN MIDDLETON, Glastullich, Nigg, Ross-shire.
	C. H. SCOTT PLUMMER of Sunderland Hall, Selkirk.
1904	JOHN M'HUTCHEN DOBBIE, Campend, Dalkeith.
	WILLIAM TAYLOR, Park Mains, Renfrew.
	W. S. FERGUSON, Pictstonhill, Perth.
	DAVID WILSON, D.Sc., of Carbeth, Killearn.
	THOMAS GORDON DUFF of Drummuir, Keith.
	Colonel ROBERT F. DUDGEON of Cargen, Dumfries.
	JOHN MACPHERSON-GRANT, Old Milton, Kingussie.
	H. M. LEADBETTER, Legerwood, Earlston.
1905	ST CLAIR CUNNINGHAM, Hedderwick Hill, Dunbar.
	ALEXANDER CROSS of Knockdon, 19 Hope Street, Glasgow.
	A. H. ANDERSON, Kippendavie Estate Office, Dunblane.
	The EARL OF MANSFIELD, Scone Palace, Perth.
	CHARLES J. CUNNINGHAM, Wooden, Kelso.
	JOHN M'CAIG, Challoch, Leswalt, Stranraer.
	WILLIAM DUTHIE, Tarves, Aberdeenshire.
	C. M. CAMERON, Balnakyle, Munlochy.

Extraordinary Directors.

1905	Colonel Charles Hope of Cowdenknowes, Earlston.
	H. B. Marshall of Rachan, Broughton, Peeblesshire.
	James A. W. Mein of Hunthill, Jedburgh.
	Athole S. Hay of Marlefield, Roxburgh.
	M. G. Thorburn of Glenormiston, Innerleithen.
	Adam S. Logan, Ferney Castle, Reston.
	George W. Constable, Traquair Estate Office, Innerleithen.
	John Oliver, Lynnwood, Hawick.
	Andrew T. Elliot, Newhall, Clovenfords.
	H. Ballantyne, jun., Provost of Peebles.
1903	Robert Paterson, Hill of Drip, Stirling.
	John Ballingall, Dunbog, Newburgh, Fife.
1904	F. W. Christie, Dairsie Mains, Dairsie, R.S.O.
	John Wilson, Chapelhill, Lauder Road, Edinburgh.
	Andrew Ralston, Glamis.
	John M. Aitken, Norwood, Lockerbie.
	James I. Davidson, Saughton Mains, Corstorphine.
1905	John Cran, Kirkton, Bunchrew, Inverness.
	William T. Malcolm, Dunmore, Larbert.
	Captain G. D. Clayhills Henderson of Invergowrie, R.N., Dundee.

Office-Bearers.

Sir James H. Gibson-Craig of Riccarton, Bart., *Treasurer.*
Sir John Gilmour of Montrave, Bart., *Honorary Secretary.*
James Macdonald, F.R.S.E., *Secretary.*
Rev. Archibald Scott, D.D., *Chaplain.*
James Hendrick, B.Sc., F.I.C., Agricultural Department, Marischal College, Aberdeen, *Chemist.*
William Home Cook, C.A., 42 Castle Street, *Auditor.*
Tods, Murray, & Jamieson, W.S., *Law Agents.*
A. N. M'Alpine, 6 Blythswood Square, Glasgow, *Consulting Botanist.*
R. S. MacDougall, M.A., D.Sc., 13 Archibald Place, *Consulting Entomologist.*
John Macdiarmid, *Clerk.*
Edward M. Cowie, *Second Clerk.*
William Blackwood & Sons, 45 George Street, *Printers and Publishers.*
Keith & Co., 43 George Street, *Advertising Agents.*
G. Waterston & Sons, 35 George Street, *Stationers.*
Thomas Smith & Sons, 47 George Street, *Silversmiths.*
Alexander Kirkwood & Son, 9 St James' Square, *Medallists.*
John Watherston & Sons, *Inspectors of Works.*
D. Macandrew & Co., 120 Loch Street, Aberdeen, *Showyard Contractors.*
William Simpson, *Messenger.*

Chairman of Board of Directors.

David Wilson, D.Sc., of Carbeth.

Chairmen of Committees.

1. *Argyll Naval Fund* . .	Captain G. D. Clayhills Henderson.
2. *Finance, Chambers, and Law*	Sir James H. Gibson-Craig, Bart.
3. *Publications* . . .	Very Rev. John Gillespie, LL.D.
4. *Shows*	Alex. M. Gordon.
5. *Science*	David Wilson of Carbeth.
6. *General Purposes* . .	Sir James H. Gibson-Craig, Bart.
7. *Education*	Very Rev. John Gillespie, LL.D.
8. *Forestry*	The Earl of Mansfield.

COMMITTEES FOR 1905-1906

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1. ARGYLL NAVAL FUND.

Capt. G. D. Clayhills Henderson of Invergowrie, R.N., Dundee, *Convener.*
J. Patten MacDougall, 39 Heriot Row, Edinburgh.
John Maclachlan of Maclachlan, 48 Castle Street, Edinburgh.
Sir John Gilmour of Montrave, Bart., Leven.
Sir Kenneth Mackenzie of Gairloch, Bart., 10 Moray Place, Edinburgh.

2. FINANCE, CHAMBERS, AND LAW.

Sir James H. Gibson-Craig of Riccarton, Bart., *Convener.*
The Earl of Mansfield, Scone Palace, Perth.
Alexander Cross of Knockdon, 19 Hope Street, Glasgow.
A. M. Gordon of Newton, Insch, Aberdeenshire.
John M'Hutchen Dobbie, Campend, Dalkeith.
W. S. Ferguson, Pictstonhill, Perth.
Jas. I. Davidson, Saughton Mains, Corstorphine.
David Wilson of Carbeth, Killearn.
Sir John Gilmour of Montrave, Bart., Hon. Secretary, *ex officio.*
William Home Cook, C.A., Auditor, *ex officio.*

3. PUBLICATIONS.

Very Rev. John Gillespie, LL.D., Mouswald Manse, Ruthwell, R.S.O., *Convener.*
John Speir, Newton Farm, Newton, Glasgow.
David Wilson of Carbeth, Killearn.
R. Shirra Gibb, Boon, Lauder.
Sir Robert D. Moncreiffe of Moncreiffe, Bart., Bridge of Earn.
John M'Hutchen Dobbie, Campend, Dalkeith.
John Wilson, Chapelhill, Lauder Road, Edinburgh.

4. SHOWS.

Alex. M. Gordon of Newton, Insch, Aberdeenshire, *Convener.*
Very Rev. John Gillespie, LL.D., Mouswald Manse, Ruthwell, R.S.O., *Vice-Convener.*
Sir James H. Gibson-Craig of Riccarton, Bart., Currie.
John Cran, Kirkton, Bunchrew, Inverness.
Sir John Gilmour of Montrave, Bart., Leven.
John Marr, Upper Mill, Tarves.
Jonathan Middleton, Glastullich, Nigg, Ross-shire.
W. S. Ferguson, Pictstonhill, Perth.
Alex. Cross of Knockdon, 19 Hope Street, Glasgow.
J. D. Fletcher of Rosehaugh, Avoch, R.S.O., Ross-shire.

C. M. Cameron, Balnakyle, Munlochy.
John Wilson, Chapelhill, Lauder Road, Edinburgh.
William Duthie, Tarves, Aberdeenshire.
Robert F. Dudgeon of Cargen, Dumfries.
John M'Hutchen Dobbie, Campend, Dalkeith.
John M'Caig, Challoch, Leswalt.
Sir R. W. Buchanan Jardine of Castlemilk, Bart., Lockerbie.
William Clark, Netherlea Farm, Cathcart.
Sir Robert D. Moncreiffe of Moncreiffe, Bart., Bridge of Earn.
John Murray, Munnieston, Kippen Station, Stirling.
William Taylor, Park Mains, Renfrew.
F. W. Christie, Dairsie Mains, Dairsie, R.S.O.
A. H. Anderson, Kippendavie, Dunblane.
Charles Howatson of Glenbuck, Glenbuck.
St Clair Cunningham, Hedderwick Hill, Dunbar.
Charles J. Cunningham, Wooden, Kelso.
James Stenhouse, Turnhouse, Cramond Bridge.
E. Douglas Paton, Broomhill, Melrose.
J. Ernest Kerr, Harviestoun Castle, Dollar.
Thomas Gordon Duff of Drummuir, Keith.
Robert Paterson, Hill of Drip, Stirling.
John Macpherson-Grant, yr. of Ballindalloch, Old Milton, Kingussie.
W. T. Malcolm, Dunmore, Larbert.

5. SCIENCE.

David Wilson of Carbeth, Killearn, *Convener*.
Jonathan Middleton, Glastullich, Nigg, Ross-shire, *Vice-Convener*.
The Earl of Mansfield, Scone Palace, Perth.
R. Shirra Gibb, Boon, Lauder.
W. S. Ferguson, Pictstonhill, Perth.
John Speir, Newton Farm, Newton, Glasgow.
Andrew Hutcheson, Beechwood, Perth.
Alex. Cross of Knockdon, 19 Hope Street, Glasgow.
Very Rev. John Gillespie, LL.D., Mouswald Manse, Ruthwell, R.S.O.
John Wilson, Chapelhill, Lauder Road, Edinburgh.
Sir John Gilmour of Montrave, Bart., Leven, Fife.
John M'Hutchen Dobbie, Campend, Dalkeith.
John M'Caig, Challoch, Leswalt.
C. H. Scott Plummer of Sunderland Hall, Selkirk.
James Stenhouse, Turnhouse, Cramond Bridge.
John Ballingall, Dunbog, Newburgh, Fife.
Thomas Gordon Duff of Drummuir, Keith.
J. M. Aitken, Norwood, Lockerbie.
Sir Archibald Buchan Hepburn of Smeaton, Bart., Prestonkirk.
James Hendrick, Chemist, *ex officio*.
A. N. M'Alpine, Botanist, *ex officio*.

6. GENERAL PURPOSES.

Sir James H. Gibson-Craig of Riccarton, Bart., Currie, *Convener*.
The Earl of Mansfield, Scone Palace, Perth.
G. R. Glendinning, Hatton Mains, Kirknewton.
Alex. M. Gordon of Newton, Insch, Aberdeenshire.
Very Rev. John Gillespie, LL.D., Mouswald Manse, Ruthwell, R.S.O.
John M'Hutchen Dobbie, Campend, Dalkeith.
Sir Archibald Buchan Hepburn of Smeaton, Bart., Prestonkirk.
John Wilson, Chapelhill, Lauder Road, Edinburgh.
Sir John Gilmour of Montrave, Bart., Leven, *ex officio*.
James I. Davidson, Saughton Mains, Corstorphine.

7. EDUCATION.

Very Rev. JOHN GILLESPIE, LL.D., Mouswald Manse, Ruthwell, R.S.O., *Convener*.
The EARL OF MANSFIELD, Scone Palace, Perth.
DAVID WILSON of Carbeth, Killearn.
ALEXANDER CROSS of Knockdon, 19 Hope Street, Glasgow.
JOHN SPEIR, Newton Farm, Newton, Glasgow.
The SECRETARY.

8. FORESTRY.

The EARL OF MANSFIELD, Scone Palace, Perth, *Convener*.
The MASTER OF POLWARTH, Humbie House, Upper Keith.
Sir JOHN GILMOUR of Montrave, Bart., Leven.
Sir ARCHIBALD BUCHAN HEPBURN of Smeaton, Bart., Prestonkirk.
A. M. GORDON of Newton, Insch, Aberdeenshire.
R. C. MUNRO FERGUSON of Raith, M.P., Kirkcaldy.
JOHN METHVEN, 15 Princes Street, Edinburgh.
Colonel F. BAILEY, 7 Drummond Place, Edinburgh.
DAVID KEIR, Ladywell, Dunkeld.
JOHN MICHIE, Balmoral, Ballater.
THOMAS GORDON DUFF of Drummuir, Keith.

9. OFFICE-BEARERS.

Sir ROBERT D. MONCREIFFE of Moncreiffe, Bart., Bridge of Earn.
Sir ARCHIBALD BUCHAN HEPBURN of Smeaton, Bart., Prestonkirk.
Sir JAMES H. GIBSON-CRAIG of Riccarton, Bart., Currie.
Sir JOHN GILMOUR of Montrave, Bart., Leven.
C. H. SCOTT PLUMMER of Sunderland Hall, Selkirk.
DAVID WILSON, D.Sc., of Carbeth, Killearn.
ALEXANDER CROSS of Knockdon, 19 Hope Street, Glasgow.
Very Rev. JOHN GILLESPIE, LL.D., Mouswald Manse, Ruthwell.
W. S. FERGUSON, Pictstonhill, Perth.
JONATHAN MIDDLETON, Glastullich, Nigg, Ross-shire.
JOHN M'HUTCHEN DOBBIE, Campend, Dalkeith.
WILLIAM DUTHIE, Tarves.
ST CLAIR CUNNINGHAM, Hedderwick Hill, Dunbar.
W. M. LEADBETTER, Legerwood, Earlston.
A. H. ANDERSON, Kippendavie, Dunblane.

The President, Vice-Presidents, the Treasurer, Honorary Secretary, and Chairman of Directors are members *ex officiis* of all Committees.

REPRESENTATIVES ON OTHER BODIES.

National Agricultural Examination Board.

Very Rev. JOHN GILLESPIE, LL.D., Mouswald Manse, Ruthwell, R.S.O.
ALEX. CROSS of Knockdon, 19 Hope Street, Glasgow.
JOHN SPEIR, Newton Farm, Newton, Glasgow.
DAVID WILSON of Carbeth, Killearn, *Chairman of the Board*.
The EARL OF MANSFIELD.
JAMES MACDONALD, *Secretary*.

West of Scotland Agricultural College.

Very Rev. John Gillespie, LL.D., Mouswald Manse, Ruthwell, R.S.O.
John M. Martin, Murieston House, Mid-Calder.

Edinburgh and East of Scotland College of Agriculture.

R. Shirra Gibb, Boon, Lauder.
James Macdonald, *Secretary*.

Aberdeen and North of Scotland College of Agriculture.

T. Gordon Duff of Drummuir, Keith.
William Duthie, Tarves.

Royal (Dick) Veterinary College.

John M. Martin, Murieston House, Midcalder.

MEETINGS.

General Meetings.—By the Charter the Society must hold two General Meetings each year, and, under ordinary circumstances, they are held in the months of January and June, in the Society's Hall, 3 George IV. Bridge, for the election of Members and other business. Twenty a quorum.

By a resolution of the General Meeting on 15th January 1879, a General Meeting of Members is held in the Showyard on the occasion of the Annual Show. This year it will be held at Peebles, on Wednesday, 18th July, at an hour to be announced in the programme of the Show.

With reference to motions at General Meetings, Bye-Law No. 10 provides—"That at General Meetings of the Society no motion or proposal (except of mere form or courtesy) shall be submitted or entertained for immediate decision unless notice thereof has been given a week previously to the Board of Directors, without prejudice, however, to the competency of making such motion or proposal to the effect of its being remitted to the Directors for consideration, and thereafter being disposed of at a future General Meeting."

General Show at Peebles—17th, 18th, 19th, and 20th July.—Entries close for Implements, 14th May; Stock, Poultry, and Dairy Produce, 8th June.

Directors' Meetings.—The Board of Directors meet (except when otherwise arranged) on the first Wednesday of each month from November till June inclusive, at half-past one o'clock P.M., and occasionally as business may require, on a requisition by three Directors to the Secretary, or on intimation by him. Seven a quorum.

Committee Meetings.—Meetings of the various Committees are held as required.

Nomination of Directors.—Meetings of Members, for the purpose of nominating Directors to represent the Show Districts on the Board for the year 1907-1908, will be held at the places and on the days after mentioned:—

Year 1907-1908.

1. Edinburgh, 3 George IV. Bridge,	Wed., 13th Feb. 1907, at 2.
2. Glasgow, North British Railway Hotel	Wed., 20th Feb. 1907 at 1.
3. Stirling, Golden Lion Hotel,	Thur., 21st Feb. 1907, at 1.30.
4. Dumfries, King's Arms Hotel,	Wed., 27th Feb. 1907, at 1.
5. Perth, Salutation Hotel,	Fri., 22nd Feb. 1907, at 2.
6. Kelso, Cross Keys Hotel,	Fri., 1st Mar. 1907, at 12.30.
7. Aberdeen, Imperial Hotel,	Fri., 8th Mar. 1907, at 2.
8. Inverness, Station Hotel,	Tues., 12th Mar. 1907, at 12.30.

The nomination of Tenant-Farmers or other Members paying the lower subscription must be made in the 3rd, 4th, 7th, and 8th Districts; and the nomination of Proprietor or other Members paying the higher subscription, in the 1st, 2nd, 5th, and 6th Districts.

EXAMINATIONS.

Agriculture.—The Examination for 1906 for the National Diploma in Agriculture will be held at the University, Leeds, on Monday, 7th May, and following days. Entries close on 31st March.

Forestry.—The Examination for the Society's Certificates in Forestry will be held at 3 George IV. Bridge, Edinburgh, on 10th, 11th, and 12th April 1906. Entries close on 9th March.

Dairy.—The Examination for 1906 for the National Diploma in Dairying will be held at the Dairy School, Kilmarnock, on Monday, 1st October and following days. Entries close on 31st August.

AGRICULTURAL EDUCATION

By a Supplementary Charter under the Great Seal, granted in 1856, the Society is empowered to grant Diplomas.

From 1858 to 1899 the Society held an annual Examination for Certificate and Diploma in Agriculture. In 1872 the Free Life Membership of the Society was granted to winners of the Diploma. In 1884 permission was given to holders of the Diploma to append the letters F.H.A.S. to their names.

In 1898 it was resolved by the Royal Agricultural Society of England and the Highland and Agricultural Society of Scotland to discontinue the independent Examinations in Agriculture held by the two Societies, and to institute in their stead a Joint-Examination for a NATIONAL DIPLOMA IN AGRICULTURE (N.D.A.) This Examination is now conducted under the management of the "National Agricultural Examination Board" appointed by the two Societies. In the year 1903, on the invitation of the two Societies, the Board of Agriculture and the Scotch Education Department agreed to appoint a representative from each to act on the Examination Board. Dr Somerville represents the former and Mr John Struthers, C.B., the latter body.

REGULATIONS AND SYLLABUS OF THE EXAMINATION FOR THE NATIONAL DIPLOMA IN THE SCIENCE AND PRACTICE OF AGRICULTURE.

REGULATIONS.

1. The Societies may hold conjointly, under the management of the National Agricultural Examination Board appointed by them, an annual Examination in the Science and Practice of Agriculture, at a convenient centre.

2. Candidates who pass the Examination will receive the National Diploma in Agriculture—the Diploma to be distinguished shortly by the letters "N.D.A."

3. The Examination will be conducted by means of written papers and oral Examinations.

4. The Examination must be taken in Two Parts as follows:—

First Part.

1. Agricultural Botany.
2. Mensuration and Land Surveying (*or Agricultural Book-keeping*).
3. General Chemistry.
4. Geology.
5. Agricultural Zoology.

Second Part.

6. Practical Agriculture.
7. Agricultural Book-keeping (*or Mensuration and Land Surveying*).
8. Agricultural Chemistry.
9. Agricultural Engineering.
10. Veterinary Science.

Candidates have the option of taking Mensuration and Land Surveying in the First Part and Agricultural Book-keeping in the Second Part, or of taking Agricultural Book-keeping in the First Part and Mensuration and Land Surveying in the Second Part. The choice must be declared on the Entry Form at the time of Entry for the First Part.

5. The maximum number of marks obtainable and the minimum number of marks in each subject qualifying for the Diploma will be as follows:—

SUBJECT.	Max. No. of Marks.	Pass Marks for Diploma.
First Part—		
1. Agricultural Botany	200	120
2. Mensuration and Land Surveying	200	120
3. General Chemistry	200	120
4. Geology	100	50
5. Agricultural Zoology	100	50
Second Part—		
6. Practical Agriculture	500	300
7. Agricultural Book-keeping	200	120
8. Agricultural Chemistry	200	120
9. Agricultural Engineering	200	120
10. Veterinary Science	100	50

6. A Candidate who obtains not less than three-fourths (1500) of the aggregate maximum marks (2000) in the entire Examination will receive the Diploma with Honours, provided that he obtains not less than three-fourths (375) of the maximum marks (500) in the subject of Practical Agriculture.

7. In the Examination of 1906, a Gold Medal will be awarded to the Candidate on the Honours List who obtains the highest number of total marks in the whole Examination. (*It is the intention of the Board to discontinue the offer of a Gold Medal after the year* 1906.)

8. A Candidate will not be entitled to take both Parts of the Examination at one time. A year at least must elapse between the passing of the First Part and sitting for the Second Part; and the Second Part must, except with the special permission of the Board, be taken within two years of the passing of the First Part.

9. A non-returnable fee of £1 will be required from each Candidate for each Part of the Examination.

10. A Candidate who fails to obtain Pass marks in any of the subjects in Part I. must take the entire Part again. A Candidate who fails to obtain Pass marks in more than one of the subjects in Part II. must take the entire Part again. A Candidate who fails in one subject only in Part II. may come up again for that subject alone.

11. Holders of the First Class Certificate of the Royal Agricultural Society of England and of the Diploma of the Highland and Agricultural Society of Scotland will not be eligible for this Examination.

12. The Board reserve the right to postpone, abandon, or in any way, or at any time, modify an Examination, and also to decline at any stage to admit any particular Candidate to the Examination.

The Seventh Examination for the National Diploma in Agriculture will take place in the Great Hall of the Leeds University, on Monday, May 7, 1906, and following days. Forms of application for permission to sit at the Examination may be obtained in due course from the Secretary, Royal Agricultural Society of England, 13 Hanover Square, London, W., or from the Secretary, Highland and Agricultural Society of Scotland, 3 George IV. Bridge, Edinburgh, and must be returned duly filled up not later than Friday, March 31, 1906, when the Entries will close.

By Order,

ERNEST H. GODFREY,
Secretary to the Board.

December 1905.

SYLLABUS OF SUBJECTS OF EXAMINATION.

FIRST PART.

I.—AGRICULTURAL BOTANY.

1. *Morphology.*—The structure of plants. The principles of classification. The Natural Orders (Phanerogams and Cryptogams), dealing specially with those of importance to the Agriculturist.

2. *Physiology.*—The life of the plant. Organs and their functions—nutritive and reproductive.

3. *Pathology.*—Diseases of plants, and their causes. Parasites—Phanerogams, Fungi, Bacteria. Prevention and cure.

4. *Cultivation.*—Conditions in plant life favourable to (*a*) the improvements of cultivated plants, and (*b*) the destruction of weeds. New varieties of plants. Pastures. Pruning.

N.B.—*Candidates will be required to identify plants usually found on a farm.*

II.—MENSURATION AND LAND SURVEYING.

1. Ordinary rules of superficial and solid mensuration. Volume of a prismoid. Applications to practical questions. Estimation of weights of bodies whose dimensions and specific gravity are known.

2. Land surveying by chain. Plotting from field-book, and determination of areas surveyed. The simpler "field problems."

3. The use and adjustment of instruments employed in Surveying and Levelling.

4. Levelling and plotting from field-book.

5. A sufficient knowledge of Trigonometrical Surveying for the determination of heights and distances by Theodolite; as essential to this, solution of plane triangles by the aid of Logarithmic Tables.

6. A knowledge of the various classes of maps published by the Ordnance Survey Department and their Scales.

N.B.—*Each candidate should have with him at the Examination a pair of compasses, scales of equal parts, including a scale of one chain to an inch, and the scale fitting the Ordnance map,* $\frac{1}{2500}$, *or* 25·344 *inches to the mile, a small protractor, a set square, and a straight-edge about* 18 *inches in length.*

III.—GENERAL CHEMISTRY.

Chemical Physics.

Matter and Energy—Pure and mixed matter—Methods of separating Mixtures—Simple and Compound substances—Kinetic and Potential energy—Transformation and Conservation of Energy.

The solid, liquid, and gaseous states of matter and the phenomena accompanying change of state.

Heat—the measurement of Heat—thermometers—calorimeter—the effects of Heat and pressure on Gases.

Gaseous diffusion—vapour tension—the barometer.

Mass and Weight—the balance—Specific Gravity—Density—Hydrometry.

Metric system of weights and measures.

Inorganic Chemistry.

The chief elements found in the commonest forms of matter.

The atomic theory—molecular condition of matter—atomic and molecular weights.

Chemical combination—symbolic notation—equations.

Hydrogen—its compounds with chlorine, oxygen, nitrogen, and carbon.

Oxygen—oxidation—combustion—respiration.

Water—natural waters—their impurities and purification.

Acids—bases—salts.

Carbon—its compounds with oxygen, sulphur, and nitrogen.

Nitrogen—nitric acid—nitrates—and nitrites.

Sulphur—sulphides—sulphuric and sulphurous acids—sulphates.

Chlorine—Bromine—Iodine.

Chlorides—Chlorates—chloride of lime, bleaching.

Phosphorus—phosphates—superphosphate.

Silica—silicates—arsenic.

Metals—ores—general metallurgic processes.

Alkalies—Chief Alkaline salts—Alkalimetry—Acidimetry.

Lime—the chief Lime compounds.

Magnesium, Zinc, Iron, Lead, Copper, Mercury, Silver, and their technically important Salts.

Organic Chemistry.

Distillation of Coal and Wood—Nature of chief products.

Hydrocarbons—Paraffins—Olefines and their chief oxidation products—Alcohols, Aldehydes, Acids.

Fermentations—Alcoholic, acetic, lactic, butyric.

Carbohydrates—sugars, starch, cellulose, dextrine, gums.

Fats—glycerol—saponification.

Benzene—Phenol.

Tartaric, Citric, and other common vegetable acids.

Amines and Amides—urea.

Proteids, Peptones, Gelatine, &c.

N.B.—*In this section exact knowledge of general principles and typical compounds is expected, rather than diffuse information. Candidates are required to bring their Laboratory Notes to the Oral Examination in this subject.*

IV.—GEOLOGY.

1. Chief minerals entering into the composition of rocks. Origin and composition of aqueous and igneous rocks. General principles of the classification of rocks. Leading divisions of the stratified rocks, and their geographical distribution in the British Islands.

2. Stratification, cleavage, and faulting of rocks.

3. Influence of the geological structure of a country on the configuration of the land and the composition of the soil. Relation of strata to water-supply and drainage. Origin of springs.

4. The various mineral manures, their sources, characters, and mode of occurrence.

5. Different kinds of building-stones and road materials. Distribution of the various economical substances.

N.B.—*Candidates will be required to name and describe common rocks, minerals, and fossils, and to show some knowledge of geological maps and sections.*

V.—AGRICULTURAL ZOOLOGY.

1. The part played by common animals in helping or hindering agricultural operations, as illustrated by moles and voles, insectivorous and other birds, snails and slugs, useful and injurious insects, arachnids and myriopods, earthworms, &c.

2. *General Structure of Insects*, especially the external characters.

3. *Life-history of Insects.*—Various forms of larvæ. Economic importance of different stages.

4. *Classification of Insects.*—The general characters of the following Natural Orders: Coleoptera, Lepidoptera, Hymenoptera, Diptera, Hemiptera, Orthoptera, Neuroptera.

5. *Acarina* injurious to Food Crops and Live Stock.

6. *Parasitic Worms.*—Flukes, Tapeworms, and Threadworms.

7. *Preventive and Remedial measures* in regard to insects, acarines, and worm Parasites—*e.g.*, farm practice in relation to the discouragement of Insect Attack. Encouragement of insect-eating birds and mammals. Artificial remedies. Insecticides. Treatment for Parasites.

N.B.—*Practical acquaintance with common animals, especially insects and worm parasites, will be expected. Where the Candidate is not acquainted with the scientific name of an animal, the generally received English name will be accepted.*

SECOND PART.

VI.—PRACTICAL AGRICULTURE.

1. *Soils.*—Classification of soils—characters and composition—suitability for cultivation.

2. *Improvement of Soil.*—Drainage, Irrigation, and Warping. The application of lime—marl—clay—ashes, &c.

3. *Rotations.*—The principles of rotations—rotations suitable for different soils and climates—systems of farming.

4. *Manures.*—The properties of manures—general and special—amounts used per acre—period and mode of application—treatment and disposal of sewage.

5. *Food-stuffs.*—The properties of feeding substances—their suitability

for different classes of farm stock—considerations affecting their use—rations for different classes of stock.

6. *Crops.*—Farm crops (cereals, agricultural grasses and clovers, forage plants and roots). How they grow—their cultivation, including cleaning, harvesting, and storage—diseases—insect injuries and remedies.

7. *Weeds and Parasitic Plants.*—Best methods of eradication.

8. *Pests of the Farm.*—Injuries to crops and live stock of the farm due to mammals, birds, and insects, with their prevention and remedies.

9. *Weather.*—Meteorology, or the effect of climate on farming conditions.

10. *Live Stock.*—The breeding, rearing, feeding, and general treatment of farm stock—the different breeds of horses, cattle, sheep, pigs, and poultry—their characteristics—the districts where they are generally met with.

11. *Milk.*—The production and treatment of milk—the manufacture of cheese, butter, &c.—the utilisation of bye-products.

12. *Machinery.*—The uses and prices of the machines and implements used in farming in different parts of Great Britain.

13. *Buildings.*—Buildings required on different classes of farms in various districts.

14. *Farming Capital.*—Calculations of the cost of stocking and working arable, stock, and dairy farms. Farm valuations. Rent, taxes, and cost of labour.

N.B.—*It is essential that a Candidate know his subject practically, and that he satisfy the Examiner of his familiarity with farm routine. Candidates will be expected to illustrate their answers when necessary by intelligible sketches or diagrams.*

VII.—AGRICULTURAL BOOK-KEEPING.

1. Agricultural Book-keeping—Description of books to be kept, with examples.
2. Valuation of stock and effects.
3. Profit and Loss, and Balance Sheet.

VIII.—AGRICULTURAL CHEMISTRY.

1. *Soil.*—The origin, formation, and classification of soils. The constituents of soils. The supply of plant-food by the soil. The chemical and physical properties of soils of different kinds. The adaptation of soils to particular crops. The relations of air and water to soils. Nitrification and the biology of the soil. The chemical and physical effects of tillage operations and drainage. The improvement of soils. Causes of infertility. Mechanical and chemical analysis of soils.

2. *Plant-life.*—The constituents of plants. The relations of atmosphere, rainfall, heat, and light to vegetation. The sources of plant-food.

3. *Manures.*—The supply of plant-food by manure. The improvement of the soil by manuring. The classification of manures as regards their composition, nature, and use. The manures in general use upon the farm. Farmyard manure and other natural manures. Green-manuring. Liming, marling, claying. Artificial manures, their origin and manufacture. The changes which manures undergo in the soil. The influence of drainage. The application of manures. The analysis of manures. The adulteration of manures.

4. *Crops.*—The composition of the principal farm crops. Characteristics of particular kinds of crops. The influence of climate and season. The manuring of particular crops. The changes that take place in crops during the various stages of their growth. Rotation of crops.

5. *Foods.*—The constituents of foods, and their functions. The nutritive

value and digestibility of foods. The chemical composition and use of the principal feeding-stuffs employed on the farm, and the sources of their supply. The main facts regarding respiration and digestion. The relation of foods to the production of work, meat, milk, and manure. The adaptation of foods to special requirements. The residual manurial value of foods, and the circumstances affecting it. The estimation of unexhausted fertility. Analysis and adulteration of foods.

6. *Water.*—Rain-water. Hard and soft waters. Drinking waters. Irrigation and sewage.

7. *Dairying.*—The composition of milk, and the conditions which influence its quality and supply. Cream and cream-separation. Butter and butter-making. Cheese and cheese-making. The influence of ferments on milk and milk products. The preservation of milk. Milk-testing.

N.B.—*Candidates are required to bring their Laboratory Notes to the Oral Examination in this subject.*

IX.—AGRICULTURAL ENGINEERING.

1. *Heat.*—Specific heat; latent heat; the unit of heat. Total heat of water; as ice, water, and steam. Conduction, convection, and radiation of heat. Mechanical equivalent of heat. Principle of combustion. Quantity of heat generated by combustion. Modes of transforming heat of combustion into power, as in the steam-engine, and in gas and oil engines.

2. *Air.*—Properties of air; elasticity, density. Barometer. Moisture. Movement. Winds. Windmills.

3. *Water.*—Composition, impurities, weight. Height of column to balance atmosphere. Flow of water. Friction of water in pipes and channels. Usual speed of flow. Power derived from falls of water. Water-wheels; turbines; water-pressure engines; pumps. Potable water. Sources of supply. Means of purification. Storage.

4. *Mechanics.*—Centre of gravity; stability of structures. The lever; toothed wheels; pulleys and ropes; wrapping connectors; winches; differential pulleys. Laws of motion. Strength of materials, tensile, compressive, torsional, and transverse; elastic limit; ultimate strength. Horse-power; animal and human power. Friction of surfaces and axles; lubrication.

5. *Steam-engine.*—Construction of an ordinary portable-engine boiler, and of a Cornish boiler, and its setting. Fittings of a boiler. Construction of the stationary and portable steam-engine. Single cylinder. Double cylinder. Compound. Steam and fuel consumed per horse-power.

6. *Gas and Petroleum Engines.*—Principle of action. Sources of loss. Fuel and water required per horse-power.

7. *Electrical Generators, Motors, and Conductors.*—Principles of action. Losses in electrical machinery. Efficiency. Detection of faults. Use of fuses and cut-outs. Horse-power of motors. Ohm's law.

8. *Construction of Agricultural Implements.*—The mode of action and the general principles involved in the construction of farm implements. The adjustments of implements for different descriptions of work. Lubrication. Working or wearing parts.

9. *Cultivating Implements worked by Steam Power.*

10. *Horse-cultivating Implements.*—Ploughs. Cultivators or Grubbers. Harrows. Rollers. Scrubbers, &c.

11. *Sowing Implements.*—Drills. Manure and water drills. Broadcast barrows. Broadcasters. Manure distributors. Potato planters, &c.

12. *Hoeing Implements.*—Horse-hoes. Scufflers.

13. *Securing of Crops.*—Reaping machines. Mowing machines. Haymakers. Horse-rakes. Elevators. Silage appliances. Potato raisers, &c.

14. *Carriages.*—Carts. Waggons. Motor Waggons. Sleighs. Rick-lifters, &c.

15. *Preparing Crops for Market.*—Threshing machines. Winnowing machines. Corn screens. Hummellers. Hay and straw presses, &c.

16. *Preparing Foods.*—Mills. Chaff-cutters. Pulpers. Turnip-cutters. Cake-breakers. Cooking apparatus.

17. *Dairy Appliances.*—Cream separators. Churns. Butter-workers. Cheese tubs. Curd mills. Cheese presses. Setting-pans. Refrigerators, &c.

18. *Land Improvement.*—Drainage instruments. Limekilns. Arrangements of shafting, pulleys, clutches, &c., for farm machinery at homesteads. Building construction and material.

N.B.—*Marks will be given for neatness and accuracy of Drawing.*

X.—VETERINARY SCIENCE.

1. Anatomy and Physiology, including the comparative anatomy of the bones of the animals of the farm, and the structure and functions of the different organs and tissues of the horse, ox, sheep, and pig.
2. The digestive processes and principles of nutrition in the above animals.
3. A general knowledge of the blood and its circulation, and the processes of respiration, secretion, and excretion.
4. The physiology of reproduction, and its bearings on healthy breeding.
5. The period of gestation in the mare, cow, ewe, and sow, and the special management of these animals prior to, at the time of, and after parturition.
6. The management of farm stock in health and disease.

The following won the Diploma in 1905:—

Diploma with Honours.

Robert Dickie Watt, West of Scotland Agricultural College, Glasgow (*Gold Medal*).
Robert George White, The University, Leeds.
Neil Leitch, West of Scotland Agricultural College, Glasgow.
William George Rogerson Paterson, West of Scotland Agricultural College, Glasgow.
George Edward Steward, The University, Leeds.

Diploma.

Harold Burkitt, Armstrong College, Newcastle-on-Tyne.
Alfred Eastham, Harris Institute, Preston.
James Maconaghie Adams, Royal College of Science, Dublin.
Howard Coltman, College of Agriculture, Holmes Chapel, Cheshire.
Theodore William Shout, The University, Leeds.
George Fisher, Harris Institute, Preston.
Thomas Robson, The University, Leeds.
William Harold Birchenough, College of Agriculture, Holmes Chapel, Cheshire.
John Arthur Gallienne, University College of Wales, Aberystwyth.
Robert Wilson Parker, College of Agriculture, Holmes Chapel, Cheshire.

John Robinson, Harris Institute, Preston.
Archibald Wilson, West of Scotland Agricultural College, Glasgow.
Miss Kate Millicent Nickson, Harris Institute, Preston.
Percy Hoyles, The University, Leeds.
Robert Richardson, Harris Institute, Preston.

Examination Papers of Past Years.

Copies of the Papers set at the six Annual Examinations for the National Diploma in the Science and Practice of Agriculture held from 1900 to 1905 may be had on application. Price 6d. per set.

VETERINARY DEPARTMENT

The Society established a Veterinary Department in 1823, but by an arrangement made with the Royal College of Veterinary Surgeons, the Society's examination ceased in 1881. Holders of the Society's Veterinary Certificate are entitled to become Members of the Royal College of Veterinary Surgeons on payment of certain fees, without being required to undergo any further examination. The number of Students who passed for the Society's Certificate is 1183.

The Society votes annually eleven silver medals for Class Competition to each of the two Veterinary Colleges in Scotland, the one in Edinburgh and the other in Glasgow.

FORESTRY DEPARTMENT

The Society grants First and Second Class Certificates in Forestry.

1. An Examination will be held each year about the month of April.

2. Next Examination will be held on 10th, 11th, and 12th April 1906. Entries close on 9th March.

3. Candidates must possess—1. A thorough acquaintance with the theory and practice of Forestry. 2. A general knowledge of the following branches of study, so far as these apply to Forestry: (*a*) The Elements of Botany and Forest Zoology; (*b*) The Elements of Physics, Chemistry, and Meteorology; (*c*) Forest Engineering, including Land and Timber Measuring and Surveying; Mechanics and Construction, as applied to fencing, draining, bridging, road-making, and saw-mills; and Implements of Forestry; (*d*) Book-keeping and Accounts.

4. The examinations are open to candidates of any age, may be both written and oral, and will include such practical tests as may from time to time be decided to apply.

5. The maximum number of marks for each subject is 100; Pass marks for First-Class Certificate—Forestry, 75; all other subjects, 60. Pass marks for Second-Class Certificate—Forestry, 60; all other subjects, 50.

6. A Candidate who obtains Pass marks in certain subjects, but fails in others, may come up for these other subjects alone, it being understood that without the special permission of the Society no Candidate will be eligible to enter for more than two subsequent examinations.

7. A Candidate who has obtained the Second-Class Certificate may enter again for the First-Class Certificate.

The list of students who obtained certificates prior to 1899 appears in the 'Transactions,' Fifth Series, vol. xi. (1899).

The following have since obtained First-Class Certificates:—

Eric Arthur Nobbs, Department of Agriculture, Cape Town,	1899
George Potts, Grey College, Bloemfontein, Orange River Colony,	1899
Duncan S. Rabagliati, 1 St Paul's Road, Bradford,	1901
Frank Scott, Dumfries House Mains, Cumnock,	1903

The following have since obtained Second-Class Certificates:—

William Bruce, B.Sc., East of Scotland College of Agriculture, Edinburgh,	1901
Rajappier Swaminathan, 56 Jesus Lane, Cambridge,	1901
Thomas Usher, Courthill, Hawick,	1901
Alexander Mitchell, Braidwood, Gorebridge,	1903
Allan Carruth, Lawmarnock, Kilbarchan,	1905
Alex. M. Lumsden, Newburn Schoolhouse, Upper Largo,	1905
Robert M. Wilson, Laws Cottage, Duns,	1905

SYLLABUS OF EXAMINATION

I.—SCIENCE OF FORESTRY AND PRACTICAL MANAGEMENT OF WOODS.

I. *Principles of Scientific Forestry.*—1. Effects of heat, light, moisture, and air-currents on forest vegetation. 2. Effects of depth, porosity, moisture, and chemical composition of the soil on forest vegetation. 3. Effects of forest vegetation on the soil and air. 4. Rate and extent of development, longevity, and reproductive power of trees. 5. Pure and mixed woods. 6. Systems of sylviculture.

II. *Practical Management of Woods.*—7. Draining and irrigation. 8. Choice of species for various situations. 9. Seed and sowing, including nurseries. 10. Planting. 11. Natural regeneration by seed, shoots, and suckers. 12. Formation of mixed woods. 13. Tending of young woods. 14. Pruning. 15. Thinning. 16. Sylvicultural characteristics of the principal trees.

III. *Injuries by Storms and Fires.*—17. Storms. 18. Fires.

IV. *Timber.*—19. Its technical properties. 20. Its defects. 21. Recognition of different kinds of timber. 22. Processes for increasing its durability.

V. *Utilisation of Produce.*—23. Uses of wood and other produce. 24. Felling. 25. Conversion. 26. Seasoning. 27. Transport. 28. Sales. 29. Harvesting of bark.

VI. *Forest Organisation.*—30. General ideas regarding a regulated system of forest management.

II.—FOREST BOTANY AND FOREST ZOOLOGY.

(a) Forest Botany.

The fundamental facts of morphology, physiology, and classification of plants. The structure and function of the plant-cell and the plant-tissues. Their primary distribution. The secondary changes they exhibit in consequence of perennation.

The structure and function of the root and shoot in flowering-plants. Buds, their forms and uses. The flower. The fruit. The seed.

The structure and function of vegetative and reproductive organs of fungi.

Relationship of plants to air, soil, and water. Effect of light, heat, and mechanical agencies upon plants. Nutrition. The nature and elements of the food of plants. Sources of plant-food. The absorption, elaboration, transference, and storage of food. Respiration and transpiration. Parasites and saprophytes. Symbiosis.

Growth of plants in length and thickness. Correlation of growth, pruning. Germination of seeds. Formation of wood and bark. Healing of wounds.

Diseases of plants due to faulty nutrition and unfavourable circumstances of growth. Diseases due to attacks of fungi.

Natural reproduction and propagation by seeds and by buds. Fertilisation of flowers. Hybridisation. Artificial propagation by budding, grafting, layering, and cutting.

The characters of the large groups and classes of the vegetable kingdom. The characters of the families of plants which include the chief timber trees. The botanical characteristics of the principal British forest-trees (including the structural features of their wood). The weeds of the forest and their significance.

(b) Forest Zoology.

The group Insecta: its position in the animal kingdom. Structure, mode of reproduction, and metamorphosis of insects. The outlines of classification of the group. Conditions favourable to the numerical increase of insects. Natural checks to increase (*e.g.*, birds, mammals, parasitic insects). The identification and life-history of the more important insects injurious to forest-trees and fruit-trees. The damage caused by these insect pests and their mode of attack. The damage caused by animals. Preventive and remedial measures.

III.—PHYSICS, CHEMISTRY, AND METEOROLOGY.

Physics.

Mass, weight, specific gravity, solid, liquid, and gaseous states of matter. Capillarity, osmose, vapour tension, suction pump, force pump, syphon, barometer, atmospheric pressure. Boyle's law. Levers and pulleys. Heat, measurement of heat, specific heat; transference of heat by conduction, convection, and radiation. Boiling and freezing. Latent heat. The thermometer. The conservation and transformation of energy. Light—reflection, refraction, polarisation; the spectrum. The rudiments of electricity and magnetism.

Chemistry.

Elements. Oxygen, hydrogen, nitrogen;—their preparation, properties, and chief compounds. Acids, bases, salts. Combustion, oxidation, reduction. Sulphur, carbon, phosphorus; and their compounds, with oxygen and hydrogen. Metals—potassium, sodium, calcium, magnesium, aluminium, iron, copper, lead, mercury, and their chief compounds. Carbohydrates, marsh gas, olefiant gas, alcohol, acetic acid, oxalic acid. Distillation of wood and coal.

Meteorology.

The atmosphere, its composition and physical properties. Measurement of pressure and temperature. The barometer. Rain, hail, snow, fog, cloud, dew, the dew point, hoar frost. The weathering of rocks and soils. Gases injurious to vegetation.

IV.—FOREST ENGINEERING, INCLUDING LAND AND TIMBER MEASURING AND SURVEYING; MECHANICS AND CONSTRUCTION AS APPLIED TO FENCING, BRIDGING, ROAD-MAKING, AND SAW-MILLS.

1. The use of the level and measuring-chain. Measuring and mapping surface areas. 2. The measurement of solid bodies—as timber, stacked bark, fagots, &c., earthwork. 3. The different modes of fencing and enclosing plantations; their relative advantages, durability, cost of construction, and repairs. 4. The setting out and formation of roads for temporary or permanent use. 5. The construction of bridges over streams and gullies; of gates or other entrances. 6. The construction and working of estate saw-mills.

V.—BOOK-KEEPING AND ACCOUNTS.

1. Questions in Practice, Proportion, and Decimal Fractions. 2. Book-keeping—describe books to be kept; and best method of valuing timbei 3. Practical questions in Book-keeping will also be given.

EXAMINATION PAPERS, 1905

PRACTICAL FORESTRY.

1. A proprietor, who has extensive plantations of different ages that have been neglected, wishes them put in proper order. Explain how you would treat—

(1) A plantation ten years of age, in which broom, whins, and briers have been allowed to grow and interfere with the growth of the trees.

(2) A plantation thirty years of age which has been neglected by the want of thinning. When it was planted, 3000 plants (Scots Fir, Spruce, and Larch) were used per acre. About how many trees per acre should be taken out at the first

thinning? Estimate the probable number left on the ground, and their value.

(3) A plantation (chiefly of Scots Fir and Larch) eighty years of age, which has been over-thinned. Vacant spots are found all over it. What operations would you recommend to be carried out, and at what probable expense?

2. A wire fence has to be erected with Larch intermediate and straining posts. The fence is to consist of six wires, and is to resist sheep and cattle.

(1) Describe the size of posts to be used, their distance apart, how they are to be secured in the ground and to what depth, and the cost of each variety after being carted six miles.

(2) Describe the distance apart of the wires, and the best kind of wire to be used. What would be the cost per cwt. of annealed, bright, galvanized, and strand wire?

(3) Describe how the wire is to be tightened. What would be the cost of the fence per hundred yards?

3. Wanted, a nursery for an estate having extensive woodlands, and where about forty acres are to be planted annually. Describe how you would select a site, how you would prepare the soil for seed-beds, and what extent of ground would you enclose. One-third of the crop would be hardwoods, the remainder chiefly conifers, a small portion being for ornamental use. How would you stock your ground? Give the prices of each variety per thousand when purchased for the nursery.

4. In laying out plantations of considerable extent various soils and exposures are met with. How would you treat a large area of land fairly within the influence of the sea, but not very exposed to it?

(1) (*a*) High lying, exposed, thin, damp peaty soil?
(*b*) Moderately exposed soil, deep but moory?
(*c*) Low-lying, rather sheltered alluvial soil?
(*d*) Sandy soils exposed to sea breezes?

(2) How would you treat the same variety of soils and exposures if situated inland quite beyond the influence of the sea?

State variety of plants, size or age, best time to plant, method of planting, distance apart, and give your reasons.

5. Instead of selling the timber standing in the woodlands it is proposed to manufacture or convert it. Describe briefly (1) the details of a sawmill suitable for converting a mixed crop; (2) the amount of power required to drive or propel circular, vertical, or other saws at their proper speeds. (3) State the sizes and thicknesses generally per B.W.G. of the various saws, and the number of revolutions per minute required to do proper work.

6. How many cubic feet of rough timber of fairly cylindrical form would be required to produce say five hundred superficial feet of boarding 1 in., 2 in., and 2¼ in. thick, cut by a saw requiring a draft of ⅛th of an inch?

7. Name a few of the diseases incidental to forest trees:—
(*a*) Diseases of the root.
(*b*) Diseases of the stem.
(*c*) Diseases of the leaf.

Describe the cause and effect.

(*Two hours allowed.*)

FOREST BOTANY AND FOREST ZOOLOGY.

(*Candidates are expected to answer* five *of the questions*—three *from the Section of Forest Botany, and* two *from the Section of Forest Zoology.*)

(*A*) FOREST BOTANY.

1. State what you know of the genus Pinus. Enumerate the species that are useful as timber trees. Which of them can grow in Great Britain? In what situations would you plant each kind?

2. Describe the method of water-absorption of a forest tree. Point out the relationship of the roots of the tree to the soil, and show how temperature, amount of water, chemical nature of particles, affect the absorption by the root.

3. Give an account of any disease of a forest tree due to the attack of another plant. Describe the life-history of the attacking plant and its effect upon the forest tree. What preventive and curative measures would you adopt in the case you describe?

4. Describe the structure and position of the buds of Oak, Elm, Walnut, Alder, Beech, Ash. Explain the value to the plant of the parts you describe.

(*B*) FOREST ZOOLOGY.

1. Describe an insect under the following heads:—

(*a*) Mode of breathing;
(*b*) Mouth parts;
(*c*) Sense organs.

2. Give the life-history of the Pine Sawfly (*Lophyrus pini*), and say how you would recognise the adult insect, the cocoon, and the damage.

3. What measures would you adopt against the following insects: the Winter Moth, the Codling Moth, the Pine Beetle (*Hylesinus piniperda*), the Beech Scale (*Cryptococcus fagi*)?

(*Two hours allowed.*)

PHYSICS, CHEMISTRY, METEOROLOGY.

1. What is meant by latent heat? Equal weights of water at 0°C and 100°C are mixed; and equal weights of ice at 0°C and water at 100°C are also mixed. What will be the resultant temperature in each case?

2. Calculate the weight of potassium hydrate required to neutralise 150 grams of pure sulphuric acid. What other substances are formed in the reaction, and in what quantities by weight?

3. Name and give the formulæ of three common compounds of aluminium with which you are acquainted. For what purposes are these substances used?

4. What is acetic acid? Describe two methods of obtaining it.

5. Under what conditions is dew deposited? What is meant by the dew-point?

(*An hour and a half allowed.*)

LAND MEASURING, &c.

1. Sketch on sheet of paper a four-sided figure of quite irregular outline, and lay down upon it four chain lines and two diagonals, marking the corners ABCD.

Describe how you would survey this ground, which is proposed to be planted, with the chain, and how you would plot a plan of it.

2. Adopt the same outline, but assume it to be close plantation requiring to be measured from the outside. Lay down chain lines outside the fences and extend these lines at the corners, and explain how you would survey, and plot a plan by measuring the angles by the chain.

3. It is required to erect a wire fence between two existing fences A and B, which points cannot be seen the one from the other owing to a hill intervening between. Place two poles on the hill top, being visible from both A and B in the straight line between them without the use of a theodolite, and state how you do so.

4. Give a sketch of the best method of constructing a dry-stone dyke to enclose a plantation and for stability.

5. Sketch the best form of gate for estate purposes constructed of estate timber.

6. Calculate the contents of a cutting 200 yards long, 15 feet wide at the bottom, 2 feet and 3 feet deep at the ends respectively, 5 feet deep in the centre, with side slopes of 1½ horizontal to 1 perpendicular, and state result in cubic yards.

7. Sketch a bridge over a gully 15 feet wide of timber from the estate, 12 feet between parapets.

(*Two hours allowed.*)

ARITHMETIC AND BOOK-KEEPING.

1. Reduce to decimals $\frac{247}{\frac{5}{7}}+\frac{1512}{108}+\frac{17}{7\frac{5}{9}}+200\frac{7}{10}+\frac{11}{62\cdot5}$.

2. Find by practice the cost of weeding a plantation of 425 acres, 3 roods, 26⅔ poles, at 17s. 6d. per acre.

3. A beam 24 feet long, 1 foot 10½ inches broad, and nine inches thick, weighs 1600 lb. What must be the length of another beam whose breadth is 1 foot 7½ inches, thickness 7½ inches, and weight 3042 lb.? Express the answer in feet and decimals of a foot.

4. The wages of 25 men amount to £76, 13s. 4d. in 16 days of 10 hours. What will the wages of 45 boys for 24 days of 8 hours amount to, if the boys receive only half as much per hour as the men?

5. Name the books which you would recommend a forester to keep, and explain very shortly the use of each.

6. Give a specimen page of the book you would recommend for recording sales by public auction on a large estate.

7. The following is a statement of the transactions, cash and otherwise, for the month of June 1904, recorded in the note book of George Wood, forester on the estate of Larchdale.

1904.					
June	1.	Bought from A. Walls, implements to the value of	£27	10	0
"	4.	Received cash, being price of 1000 Scots pines sold by public auction	310	0	0
	"	Paid into bank	200	0	0
	"	" cash, A. Walls, to account . . .	15	0	0
	5.	Sold to John Green, 1500 larch trees at 11s. .	825	0	0
	6.	Paid cash, being quarter's salary to George Wood	55	0	0
	8.	Sold to John Green, 19 tons of oak bark at £5, 3s.	97	17	0
	9.	Bought from A. Macgregor, young trees for nursery	150	0	0
	"	Paid cash to N.B. Ry. Co. for carriage of same .	5	3	0
	11.	" cash for carpenter work . . .	11	0	0

June	13.	Received cash from John Green to account, and paid into bank	£500	0	0
"	14.	Paid A. Macgregor to account by cheque . .	100	0	0
"	17.	Sold to R. Thomson, thinnings of oak . .	70	0	0
"	"	Paid cash for repairs to cottages . . .	13	10	0
"	20.	Received cash from John Green further to account	300	0	0
"	"	Paid cash for advertising sales . . .	5	0	0
"	"	" into bank	250	0	0
"	23.	" cash for shoeing estate horses to date .	5	6	0
"	30.	Drew from bank, and paid wages for month .	743	0	0

Write up the cash-book and the ledger accounts of the various debtors and creditors, including the bank. The following is a list of the various balances at 31st May. Prepare a similar list as at 30th June.

	Dr.	*Cr.*
Cash on hand	£10 5 0	...
Bank .		£25 0 0
John Green	15 0 0	...
A. Walls .		6 0 0
A. Macgregor		17 0 0
R. Thomson	130 0 0	

(*An hour and a half allowed.*)

DAIRY DEPARTMENT

EXAMINATION IN THE SCIENCE AND PRACTICE OF DAIRYING

This Examination, instituted in 1897, is conducted by the National Agricultural Examination Board, appointed jointly by the Royal Agricultural Society of England and the Highland and Agricultural Society of Scotland.

REGULATIONS.

1. The Societies may hold annually in England and in Scotland, under the management of the National Agricultural Examination Board appointed by them, one or more Examinations for the National Diploma in the Science and Practice of Dairying; the Diploma to be distinguished shortly by the letters "N.D.D."

2. The Examinations will be held on dates and at places from time to time appointed and duly announced.

3. A deposit of £1 will be required from each candidate, which deposit will be returned only to those candidates who succeed in obtaining the Diploma at the first attempt. The Board may, at their discretion, allow an unsuccessful candidate to sit for one subsequent Examination without payment of a further deposit.

4. Forms of Entry for the Examination in England may be obtained from the Secretary of the Royal Agricultural Society of England, 13 Hanover

Square, London, W., and must be returned to him duly filled up, with the deposit of £1, on or before 31st August.

5. Forms of Entry for the Examination in Scotland may be obtained from the Secretary of the Highland and Agricultural Society of Scotland, 3 George IV. Bridge, Edinburgh, and must be returned to him duly filled up, with the deposit of £1, on or before 31st August.

6. A candidate may enter for the Examination either in England or Scotland, but not in both; and a candidate who has once taken part in an Examination in England cannot enter for an Examination in Scotland, or *vice versa*. No candidate may sit for the Examination more than twice.

7. A candidate will be required to satisfy the Examiners, by means of written papers, practical work, and *vivâ voce*, that he or she has—

(1) A general knowledge of the management of a Dairy Farm, including the rearing and feeding of Dairy Stock, the candidate being required to satisfy the examiners that he or she has had a thorough training and practical experience in all the details of Dairy work as pursued on a farm.

(2) A thorough acquaintance, both practical and scientific, with everything connected with the management of a Dairy, and the manufacture of Butter and Cheese.

(3) Practical skill in Dairying, to be tested by the making of Butter and Cheese.

(4) Capacity for imparting instruction to others.

8. The Board reserve the right to postpone, to abandon, or in any way, or at any time, to modify an Examination, and also to decline at any stage to admit any particular candidate to the Examination.

By Order,
ERNEST H. GODFREY,
Secretary to the Board,
13 Hanover Square, London, W.

December 1905.

SYLLABUS OF SUBJECTS OF EXAMINATION

I.—GENERAL MANAGEMENT OF A DAIRY FARM.

1. *General Management of Pastures and Crops on a Dairy Farm.*

2. *Buildings.*—Situation, Surroundings, Construction, Ventilation, and Drainage of Farm Buildings. Suitability of building materials. Water supply. Construction and arrangements of Dairies: (*a*) for General Purposes; (*b*) for Special Purposes.

3. *Foods and Feeding.*—Summer and Winter Feeding of Dairy Cattle. Root crops. Green fodder. Ensilage. Different kinds of food and their composition. Their effect upon Milk, Butter, and Cheese. Special Foods used in Dairy Feeding. Preparation of food for Dairy Stock. Rearing and feeding of young Stock. Feeding and management of Pigs and Poultry.

4. *Dairy Cattle in Health and Disease.*—Characteristics of different Breeds, and choice of Dairy Cattle. General functions of the organs of the animal body. Breeding. Parturition. Organs which secrete milk. Process of milk secretion. Changes which food undergoes during digestion. Diseases of Dairy Cattle and their remedies.

II.—MANAGEMENT OF A DAIRY.

1. *Milk and Cream.*—Process of Milking. Dairy Utensils and Appliances, hand and power. Cooling of Milk. Separation and ripening of Cream. Different systems of Cream-raising. Utilisation of Skim-milk. Keeping of Milk. Importance of Cleanliness. Diseases spread by Milk. Conveyance and sale of Milk. Milk records. Keeping of Dairy and Farm Accounts. Creameries. Butter and Cheese Factories. Different systems of Dairying and their comparative returns.

2. *Butter.*—Churns and other Butter-making appliances, hand and power. Souring of Cream. Churning. Washing and working of Butter. Butter-milk. Packing and transmission of Butter. Salting and keeping of Butter. Colouring. Characteristics of good Butter.

3. *Cheese.*—Principles of its manufacture. Making of different kinds of Cheese (from cream, whole-milk, and skim-milk). Acidity of Milk. Use of Rennet and its substitutes. Whey. Appliances for Cheese-making. Ripening and storage of Cheese. Packing and sale of Cheese. Making of Cream and other soft Cheeses.

III.—CHEMISTRY AND BACTERIOLOGY

[*N.B.*—In this Section there will be expected of the candidate a sound understanding of the scientific principles underlying the practice of Dairying, a knowledge of the composition, nature, properties, and changes undergone by the different substances met with in Dairying, and a general acquaintance with the principles of laboratory methods so far as Dairying is concerned.]

1. *General Principles of Chemistry.*—The nature of elements and compound bodies. The different forms of matter—solid, liquid, gaseous. Specific gravity, and instruments for determining it. Temperature, and methods of measuring it. Thermometric scales. The influence of temperature in Dairy operations. Physical and chemical changes involved in the following: solution, precipitation, filtration, distillation, oxidation, and reduction. Acids, Bases, Salts—their distinctive properties. Acidity and Alkalinity—their influence and quantitative estimation.

The Atmosphere—its constituents and impurities; its influence on Dairy operations. Atmospheric pressure.

Water—constituents of pure and natural waters. The impurities of water and whence derived. The importance of a pure water-supply in Dairying.

General knowledge of the elementary chemistry of the following substances and their compounds so far as met with in Dairying: Potash, Soda, Ammonia, Lime, Phosphoric Acid, Alcohol, Acetic Acid, Carbonic Acid, Butyric Acid, Lactic Acid, Albumen, Casein, Fats, Milk-sugar, Glycerine, Pepsin.

Saponification of Fats.

2. *Milk and its Products.*—The nature, composition, properties, and chemical constituents of milk. Microscopical appearances presented by milk. The circumstances that affect the quality and quantity of milk produced by the cow. The influence of feeding. The changes which occur in the keeping of milk, and how produced. The natural and artificial souring of milk. Rennet, its nature and use. Physical and chemical changes involved in the making and keeping of Butter, and in the manufacture and ripening of Cheese. Separated Milk, Condensed Milk, Fermented Milk. The use of Preservatives. Methods of Milk-testing—Mechanical methods, their theory and practice. A general knowledge of the methods employed in the chemical analysis of Milk and Butter. Adulteration of Milk, Cream, Butter, and Cheese—the ways in which

adulteration is practised, the changes in composition thereby produced, and a general knowledge of the methods employed in detecting the same.

3. *The Chemistry of Feeding.*—The principal constituents of Food materials, and the functions they severally fulfil. The influence of Food constituents on milk production. Assimilation and Digestion. Animal Heat and Respiration. Milk as a Food. The relation of Food to Manure.

4. *Bacteriology.*—Moulds. Yeasts. Bacteria. The principal kinds of Bacteria met with in Dairying—their forms, methods of reproduction, and conditions of life. The influence of physical agencies upon Bacterial life. Air and Water as carriers of Bacteria. The changes produced by Bacteria in milk and its products. Useful forms and their functions. Harmful forms and their effects—Coagulation, Discoloration, Taints, &c. Pathogenic organisms. The classification of organisms—organised ferments and enzymes. Methods of preparation of pure cultures and their practical use. Nutritive media. Pasteurisation and Sterilisation—the practical application of these to Dairy matters. Fermentation and Putrefaction. Disinfectants and Preservatives.

IV.—PRACTICAL SKILL IN DAIRY WORK.

Candidates must be prepared—(1) to produce at or before the Examination a satisfactory certificate of proficiency in the Milking of Cows, signed by a practical Dairy Farmer, and to satisfy the Examiners by a practical test, if so required; (2) to churn and make into Butter a measured quantity of Cream; and (3) to make one Cheese of each of the following varieties: (i) Hard-pressed, of not less than 30 lb.; (ii) Veined or blue-moulded, of not less than 10 lb.; and (iii) also to make one or other of the following Soft Cheeses: Camembert, Coulommier, or Pont l'Evêque.

V.—CAPACITY FOR IMPARTING INSTRUCTION TO OTHERS.

Candidates must also show practically that they are familiar with the management of a Dairy, and are capable of imparting instruction to

EXAMINATIONS IN 1906.

ENGLAND—Monday, September 24, and following days, at a centre to be announced; last date for receiving applications, Friday, August 31.

SCOTLAND—Monday, October 1, and following days, at the Dairy School for Scotland, Kilmarnock; last date for receiving applications, Friday, August 31.

The following obtained the Diploma in Scotland in 1905:—

John Anderson, Rampyards, Watten, Caithness.
Allan Carruth, Lawmarnock, Kilbarchan.
Horace N. Clarke, May Bank, Milngavie.
Bernard Furley Davis, Ebers Road, Nottingham.
Miss Mary H. Dott, Sandilands, Dysart, Fifeshire.

JOHN GILLIES, Brackenbridge, Lesmahagow.
Miss ELIZABETH LAIDLAW HENDERSON, Kelloside, Sanquhar.
WILLIAM LAWSON, Guildhouse, Forth, Lanarkshire.
PETER ANDREW M'WILLIAM, Cults, Castle Kennedy.
ERASTO ADOLPHUS MARIÑO, Buenos Ayres, A.R.
GEORGE EDWARD STEWARD, Eccleston, York Avenue, Great Crosby, Lancashire.
Miss JEANIE STRANG, Transy Farm, Dunfermline.
Miss ELIZABETH MATTHEWSON TOD, 10 East Fettes Avenue, Edinburgh.
ROBERT GEORGE WHITE, Rawcliffe, Skelton Road, York.
Miss MARGARET AGNES WOOD, Ruchlaw West Mains, Prestonkirk.
JAMES WOODBURN, Shawmills, Hurlford.
JOHN H. WYLLIE, Mossgiel, Mauchline.

The following obtained the Diploma in England in 1905 :—

Miss ANNIE GLADYS ANYAN, Harris Institute, Preston, and Lancashire C.C. Farm, Hutton.
Miss MABEL JESSIE CAMP, Midland Agricultural and Dairy Institute, Kingston, Derby.
DAVID ALFRED DAVIES, University College of Wales, Aberystwyth.
GRIFFITH JONES, University College of North Wales, Bangor, and British Dairy Institute, Reading.
JOHN ROBINSON, Lancashire C.C. Farm, Hutton.
CHARLES SAUNDERS, Lancashire C.C. Farm, Hutton.
VIVIAN GORDON SCASE, Midland Agricultural and Dairy Institute, Kingston, Derby, and British Dairy Institute, Reading.
JOSEPH SIMPSON, Harris Institute, Preston, and Lancashire C.C. Farm, Hutton.
Miss ELIZABETH WARD STUBBS, Midland Agricultural and Dairy Institute, Kingston, Derby.
JOHN WILLIAM TAYLOR, University College and British Dairy Institute, Reading.
HUGH MOSTYN TREVOR, Uckfield Agricultural College, and Midland Agricultural and Dairy Institute, Kingston, Derby.
WILLIAM DUNSCOMB VALLANCE, Midland Agricultural and Dairy Institute, Kingston, Derby.
JOHN WILSON, Lancashire C.C. Farm, Hutton.
WILLIAM EWART WOODWARD, Midland Agricultural and Dairy Institute, Kingston, Derby.

EXAMINATION PAPERS OF PAST YEARS.

Copies of the Papers set at the Examinations in 1904 and 1905 may be had on application. Price 6d. per set.

CHEMICAL DEPARTMENT

Chemist to the Society—JAMES HENDRICK, B.Sc., F.I.C., F.C.S.,
Agricultural Department, Marischal College, Aberdeen.

The object of the Chemical Department is to promote the diffusion of a knowledge of Chemistry as applied to agriculture among the members of the Society, to carry out experiments for that purpose, to assist members who are engaged in making local experiments requiring the direction or services of a chemist, to direct members in regard to the use of manures and feeding-stuffs, to assist them to put the purchase of these substances under proper control, and in general to consider all matters coming under the Society's notice in connection with the Chemistry of Agriculture.

MEMBERS' PRIVILEGES IN RESPECT OF ANALYSES.

The fees of the Chemist for analyses made for members of the Society shall, until further notice, be as follows:—

The estimation of *one* ingredient in a manure or feeding-stuff, .	5s.
The estimation of *two* or *more* ingredients in do. .	10s.

These charges apply only to analyses made for agricultural purposes, and for the sole and private use of members of the Highland and Agricultural Society who are not engaged in the manufacture or sale of the substances analysed.

Valuations of manures, according to the Society's scale of units, will be supplied if requested.

MISCELLANEOUS.

Analysis of water[1] to determine purity and fitness for domestic use (not more than one analysis per year for any one member), ...	£1	0	0
Analysis of agricultural products—hay, grain, ensilage, roots, &c., ...	1	0	0
Milk, full analysis, ...	0	10	0
Milk, solids and fat, ...	0	5	0
" fat only, ...	0	2	6
Butter, full analysis, ...	0	10	0
" partial analysis (solids and fat), . . .	0	5	0
Cheese, ...	0	10	0
Limestone, giving the percentage of lime, . . .	0	5	0
Limestone, complete analysis, ...	1	0	0
Lime, including ground lime, percentage of alkaline lime, .	0	5	0
" " " complete analysis, . .	1	0	0
Analysis of soil, to determine fertility and recommendation of manurial treatment, ...	1	10	0

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[1] Cases containing bottles for water samples and instructions for sampling are sent from the laboratory on application.

Complete analysis of soil,	£2 10 0
Search for poisons in food or viscera,	2 0 0
Sulphate of copper, percentage of copper and purity,	0 5 0
" " complete analysis,	0 10 0
Arsenic, carbolic acid and tar acids, and other poisons used in making sheep dips, &c,	5s. to £1

Samples should be sent (carriage paid) to James Hendrick, B.Sc., Agricultural Department, Marischal College, Aberdeen.

INSTRUCTIONS FOR SELECTING SAMPLES FOR ANALYSIS.

MANURES.

Any method of sampling mutually agreed upon between buyer and seller may be adopted, but the following method is recommended as a very complete and satisfactory one: Four or more bags should be selected for sampling. Each bag is to be emptied out separately on a clean floor, worked through with the spade, and one spadeful taken out and set aside. The four or more spadefuls thus set aside are to be mixed together until a uniform mixture is obtained. Of this mixture one spadeful is to be taken, spread on paper, and still more thoroughly mixed, any lumps which it may contain being broken down with the hand. Of this mixture two samples of about half a pound each should be taken by the purchaser or his agent, in the presence of the seller or his agent or two witnesses (due notice having been given to the seller of the time and place of sampling), and these samples should be taken as quickly as possible, and put into bottles or tin cases to prevent loss of moisture, and having been labelled, should be sealed by the samplers—one or more samples to be retained by the purchaser, and one to be sent to the chemist for analysis.

FEEDING-STUFFS.

Samples of feeding-stuffs which are in the form of meal may be taken in a similar manner.

Samples of cake should be taken by selecting four or more cakes from the bulk. These should be nutted to a size not larger than walnuts. The nutted cake should then be thoroughly mixed and samples of not less than one pound each taken from it. The samples should be put into bottles or tins, sealed up, and labelled. One sample should be sent to the analyst, and one or more duplicates retained by the purchaser.

SOILS.

Dig a little trench about two feet deep, exposing the soil and subsoil. Cut from the side of this trench vertical scrapings of the soil down to the top of the subsoil. Catch these on a clean board, and collect in this manner two pounds of soil taken from the whole surface of the section. Similar scrapings of subsoil immediately below should be taken and preserved separately. Five or six similarly drawn samples at least should be taken from different parts of the field, and kept separate while being sent to the chemist, that he may examine them individually before mixing in the laboratory.

VEGETABLE PRODUCTS.

Turnips, &c., at least 50 bulbs carefully selected as of fair average growth.

Hay, straw, ensilage, &c., should be sampled from a thin section cut across the whole stack or silo, and carefully mixed ; above 2 lb. weight is required for analysis.

Grain should be sampled like manures.

DAIRY PRODUCE.

Milk.—Samples of milk from individual cows should be taken direct from the milk-pail after complete milking. Average samples from a number of cows should be taken immediately after milking. Specify whether the sample is morning or evening milk, or a mixture of these. Samples to be tested for adulteration should not be drawn from the bottom or taken from the top of standing milk, but they should be ladled from the vessel after the milk has been thoroughly mixed. Samples of milk should be sent immediately to the analyst.

For most purposes a half-pint bottle of milk is a large enough sample.

Butter and Cheese.—About quarter-pound samples are required.

WATERS.

When the water is from a well, it should be pumped for some minutes before taking the sample.

If the well has been standing unused for a long time, it should be pumped for some hours, so that the water may be renewed as far as possible.

If the well has been newly dug or cleaned out, it should be pumped as dry as possible, daily, for a week before taking the sample.

Water from cisterns, tanks, ponds, &c., should be sampled by immersing the bottle entirely under the water, and holding it, neck upwards, some inches below the surface. *Water from the surface should not be allowed to enter the bottle.*

Spring or stream water should not be sampled in very wet weather, but when the water is in ordinary condition. Such waters should be sampled by immersing the bottle, if possible; but if not deep enough for that purpose, a perfectly clean cup should be used for transferring the water to the bottle.

When the bottle has been filled the stopper should be rinsed in the water before replacing it.

Interference with or disturbance of wells or springs, or the ground in their immediate vicinity, must be carefully avoided during sampling, and for at least twenty-four hours before it.

After a sample has been taken, it should be sent to the laboratory as speedily as possible.

A description of the source and circumstances of the water should accompany the sample, as the interpretation of the analytical results depends to some extent on a knowledge of such particulars.

N.B.—Stone jars and old wine bottles are unsuitable for conveying samples. Winchester quarts chemically cleaned should be obtained from the laboratory, Marischal College, Aberdeen.

LOCAL ANALYTICAL ASSOCIATIONS.

With the view of encouraging, as well as regulating the conduct of, Local Analytical Associations, the Society, from 1881 to 1893, contributed from its funds towards their expenses a sum not exceeding £250 annually. In view of the passing of the Fertilisers and Feeding Stuffs Act, 1893, it was decided, at a meeting of the Directors on the 6th of December 1893, to discontinue that grant after the 1st of March 1894.

COMPOSITION AND CHARACTERISTICS OF MANURES AND FEEDING-STUFFS.

(*See 'Transactions,' Fifth Series, vol. xi.* 1899.)

FORMS OF GUARANTEE

Guarantee of Manure.

I guarantee that the manure called.....................and sold by me to ....contains a minimum of—

Soluble phosphoric acid =Phosphate of lime dissolved............per cent.
Insoluble phosphoric acid=Phosphate of lime undissolved.........per cent.
Potash salts . . =Potash (K_2O) . . . .per cent.
Total nitrogen . . =Ammonia . . . .per cent.

Signature of seller.......................
Date..................19...

Guarantee of Feeding-Stuff.

I guarantee that the feeding-stuff called...............and sold by me to ....contains a minimum of—

.... per cent albuminoids.
.... per cent oil.
.... per cent carbohydrates.

Signature of seller.......................
Date........... .....19...

UNITS TO BE USED IN DETERMINING THE COMMERCIAL VALUE OF MANURES.[1]

Terms—CASH, including Bags gross weight—not including Carriage.

N.B.—These units are based on the RETAIL PRICES OF MANURES at the following seaports: Berwick, Leith, Bo'ness, Dundee, and Glasgow. When these units are multiplied by the percentages in the analysis of a Manure, they will produce a value representing very nearly the cash price at which TWO TONS may be bought in fine sowable condition. Larger purchases may be made on more favourable terms, but for smaller purchases an extra charge of 1s. 6d. per ton is made.

For Season 1906.

CASH PRICES as Fixed on 7th February.

Items to be Valued.	Peruvian (Riddled).		Bone-Meal.	Steamed Bone Flour.	Dissolved or Vitriolated Bones.	Super-phosphates.	
	Ammoniacal.	Phosphatic.				Under 30% Sol.	30% Sol. or over.
	P. unit.	P. unit.	P. unit.	P. unit.	P. unit.	P. unit.	P. unit.
Phosphates dissolved	1/5	1/5	..	..	2/7	1/10½	1/10
" undissolved			1/4	1/3	1/4	..	..
Potash	3/6	3/6	..	..	..	..	..
Nitrogen	17/-	15/-	12/1	12/1	17/-	..	..
or Ammonia	14/-	12/6	10/-	10/-	14/-	..	..
Prices per ton—							
From	160/ upwards	115/ upwards	105/-	90/-	110/-	48/-	
To	..	..	115/-	100/-	115/-	70/-	

Manures.	Guarantee.	Price per Ton.	Unit.
	Per cent.	£ s. d.	
Sulphate of ammonia[2] . . ex works	24·5 Ammonia	12 12 6	Am.=10/4
Nitrate of soda, 95 per cent,[2] ex ship at Leith and Glasgow	19 "	10 10 0	" =11/1
Nitrate of Soda . . . ex store	19 "	10 12 6	" =11/2
Muriate of potash, 80 per cent ex ship	50 Potash	8 15 0	Pot.= 3/6
Sulphate of potash, 80 per cent, or over . .	..	..	" = 3/9
Kainit . . . . . . ex ship	12·5 Potash	2 0 0	" = 3/2
" . . . . . . ex store	12·5 "	2 5 0	" = 3/7
Potash salts . . . . . ex ship	30 "	4 12 6	" = 3/-
Thomas-slag phosphate at place of production . .	30 Phosphate	1 15 0	Phos.= 1/2
" " . . .	38 "	2 0 0	" = 1/1
Ground mineral phosphate . ex store	60 "	2 7 6	" = /9½

Note.—*This Schedule of Unit Prices of Manures and Feeding-Stuffs is revised each year in the first week of February. Copies of the Schedule may be had by Members any time thereafter.*

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[1] Instructions regarding units and the valuation of manures are given on p. 37.

[2] These are the February prices, but they are subject to variation from month to month or oftener. The price ex ship for nitrate of soda applies to the ports of Leith and Glasgow only.

Feeding-Stuffs.	Average Analyses.			Price per ton at Leith and Glasgow.		
	Album.	Oil.	Carbo-hydrates.	£	s.	d.
Linseed-cake	28	9	35	8	10	0
" Canadian or American	30	7	35	7	15	0
Decorticated cotton-cake	40	10	20	7	12	6
" " Seed-meal	40	10	20	7	12	6
Undecorticated " (Egyptian)	22	5	30	5	2	6
" " (Bombay)	20	5	30	4	15	0
Bean-meal[1]	25	2	50	8	8	0
Rice-meal	11	10	50	5	7	6
Locust-bean meal	6	2	70	6	0	0
Dried Distillery grains	20	9	45	5	10	0
" Brewery or malt distillery grains	20	7	50	5	0	0
Barley-bran	15	5	50	5	5	0
Indian corn (American)[1]	10	5	55	5	2	6
Paisley meal (at Paisley)	15	9	60	5	10	0
Linseed (whole)	20	35	14	13	0	0
Linseed-oil	..	..	..	22	0	0
Treacle	..	..	..	4	10	0

[1] These are the February prices, but they are subject to variation from month to month or oftener. The price ex ship for nitrate of soda applies to the ports of Leith and Glasgow only.

CLASSIFICATION OF MANURES.

Peruvian guano	Guanos with over 5 per cent of ammonia are to be considered as ammoniacal. Those with less than this percentage are to be classed as phosphatic guano.
Bone-meal	Genuine bone-meal contains from 48 per cent to 55 per cent phosphates, and from 4 per cent to 5 per cent ammonia. If phosphates are low, ammonia will be high, and conversely.
Steamed bone-flour	Ground to flour and containing about 60 to 65 per cent phosphates, and about 1 to 2½ per cent ammonia.
Dissolved bones	Must be pure—*i.e.*, containing nothing but natural bones and sulphuric acid.
Mixtures and compound manures	To be valued according to the unit values (as given above) of the ingredients of which they are guaranteed *and also found* to be composed, with an addition of 7s. 6d. per ton for mixing.
Thomas-slag	Not less than 80 per cent of the phosphate should be citric soluble (Wagner's method). Fineness of grinding is of paramount importance. The coarsest kind used should be so finely ground that at least 80 per cent passes through a sieve of about 9600 holes per sq. inch.

INSTRUCTIONS FOR VALUING MANURES.

The unit used for the valuation of manures is the hundredth part of a ton, and as the analyses of manures are expressed in parts per hundred, the percentage of any ingredient of a manure when multiplied by the price of the unit of that ingredient represents the value of the quantity of it contained in a ton.

As an example take muriate of potash—a good sample (see p. 36) will be guaranteed to contain 80 per cent *pure* muriate of potash; the other 20 per cent consisting of unimportant impurities such as common salt. But all potash manures are valued according to the amount of Potash they yield, and 80 per cent of pure muriate of potash yields 50 per cent potash (K_2O)—*i.e.*, 50 units per ton; and as a ton of muriate of potash costs £8, 15s., the price of the unit is the fiftieth part of that—viz., 3s. 6d. If on analysis a sample of muriate of potash guaranteed to contain 50 per cent of potash is found to contain only 49 per cent, the price per ton will be 3s. 6d. less—viz., £8, 11s. 6d.

Similarly with all other manures, the price per unit is derived from the price per ton of a sample of good material up to its guarantee, and therefore the proper price per ton of a manure is found by multiplying the price of the unit of the valuable ingredient by the percentage as found by analysis. If a manure contains more than one valuable ingredient the unit value of each ingredient is multiplied by its percentage, and the values so found when added together give approximately the price per ton of the manure.

Nitrate of soda contains no ammonia but it contains nitrogen, and 14 units of nitrogen are equivalent to 17 units of ammonia, and it is the custom in Scotland to value all nitrogenous manures not according to the nitrogen they contain but according to its equivalent of ammonia.

The commercial values of manures are determined by means of the Units in the following manner:—

Take the analysis of the manure, and look for the following substances:—

Phosphates dissolved (or soluble phosphate)
„ undissolved (or insoluble „)
Nitrogen = Ammonia . . . . .
Potash . . . .

No other items but these are to be valued.

Should the analysis or the guarantee not be expressed in that way, the chemist or the seller should be asked to state the quantities in these terms.

Suppose the manure is bone-meal:—

An ordinary bone-meal will contain about 50 per cent phosphate and about 4½ per cent ammonia. The units for bone-meal are 1s. 4d. for phosphate and 10s. for ammonia. Therefore the value is—

	£	s.	d.
Insol. phosphate, 50 times 1s. 4d., equal to	£3	6	8
Nitrogen = Ammonia, 4½ times 10s., equal to	2	5	0
Say	£5	11	8 per ton.

Suppose the manure is dissolved or vitriolated bones:—

It must be guaranteed "pure."

The units in the Schedule are 2s. 7d. for soluble phosphate, 1s. 4d. for insoluble phosphate, and 14s. for ammonia.

The analysis will be about 16 per cent soluble phosphate, 20 per cent insoluble phosphate, and 3½ per cent ammonia. In that case the value would be—

				£	s.	d.
Sol. phosphate,	16 times	2s. 7d.,	equal to	£2	1	4
Insol. „	20 „	1s. 4d.,	„	1	6	8
Nitrogen = Ammonia,	3½ „	14s.,	„	2	9	0
			Say	£5	17	0 per ton.

Suppose the manure is a superphosphate,—say an ordinary superphosphate, with 28 per cent soluble phosphate and 3 per cent insoluble phosphate. It is valued thus:—

Sol. phosphate, 28 times 1s. 10½d., equal to, say, £2, 12s. 6d. per ton.
Insoluble phosphate is not valued in a superphosphate.

Note.—The units have reference solely to the Commercial Values of Manures, and not to their Agricultural Values.

Thus, in stating soluble phosphate in dissolved bones at 2s. 7d. per unit, and that in superphosphate at 1s. 10½d., it is meant that these are the prices per unit at which soluble phosphate can be bought in these two manures; but it does not mean that the soluble phosphate in the one is 10½d. per unit better as a manure than that in the other. It is probably no better.

BOTANICAL DEPARTMENT

Consulting Botanist to the Society—A. N. M'Alpine,
6 Blythswood Square, Glasgow.

The Society have fixed the following rates of charge for the examination of plants and seeds for the *bona fide* and individual use and information of members of the Society (not being seedsmen), who are particularly requested, when applying to the Consulting Botanist, to mention the kind of examination they require, and to quote its number in the subjoined schedule. The charge for examination must be paid at the time of application, and the carriage of all parcels must be prepaid.

Scale of Charges.

1. A report on the purity, amount, and nature of foreign materials, and the germinating power of a sample of seed, 1s.
2. Determination of the species of any weed or other plant, or of any vegetable parasite, with a report on its habits and the means for its extermination or prevention, 1s.
3. Report on any disease affecting farm crops, 1s.
4. Determination of the species of any natural grass or fodder plant, with a report on its habits and pasture or feeding value, 1s.

The Consulting Botanist's Reports are furnished to enable members—purchasers of seeds and corn for agricultural or horticultural purposes—to test the value of what they buy, and are not to be used or made available for advertising or trade purposes by seedsmen or otherwise.

Purchase of Seeds.

The purchaser should obtain from the vendor, by invoice or other writing, the proper designation of the seed he buys, with a guarantee of the percentage of purity and germination, and of its freedom from ergot, and in the case of clover, from the seeds of dodder or broom-rape.

It is strongly recommended that the purchase of *prepared mixtures* of seeds should be avoided. The different seeds should be purchased separately and mixed by the farmer: mixtures cannot be tested for germination.

The Sampling of Seeds.

The utmost care should be taken to secure a fair and honest sample. This should be drawn from the bulk delivered to the purchaser, and not from the sample sent by the vendor.

When legal evidence is required, the sample should be taken from the bulk, and placed in a sealed bag in the presence of a witness. Care should be taken that the sample and bulk be not tampered with after delivery, or mixed or brought in contact with any other sample or bulk.

At least one ounce of grass and other small seeds should be sent, and two ounces of cereals and the larger seeds. When the bulk is obviously impure the sample should be at least double the amount specified.

Grass seeds should be sent at least four weeks, and seeds of clover and cereals two weeks, before they are to be used.

The exact name under which the sample has been sold and purchased should accompany it.

Reporting the Results.

The Report will be made on a schedule in which the nature and amount of impurities will be stated, and the number of days each sample has been under test, with the percentage of the seeds which have germinated.

"Hard" clover seeds, though not germinating within the time stated, will be considered good seeds, and their percentage separately stated.

The impurities in the sample, including the chaff of the species tested, will be specified in the schedule, and only the percentage of the pure seed of that species will be reported upon; but the REAL VALUE of the sample will be stated. The Real Value is the combined percentages of purity and germination, and is obtained by multiplying these percentages and dividing by 100: thus in a sample of Meadow Fescue having 88 per cent purity and 95 per cent germination, 88 multiplied by 95 gives 8360, and this divided by 100 gives 83·6, the Real Value.

Selecting Specimens of Plants.

The whole plant should be taken up and the earth shaken from the roots. If possible the plants must be in flower or fruit. They should be packed in a light box, or in a firm paper parcel.

Specimens of diseased plants or of parasites should be forwarded as fresh as possible. They should be placed in a bottle, or packed in tinfoil or oil-silk.

All specimens should be accompanied with a letter specifying the nature of the information required, and stating any local circumstances (soil, situation, &c.) which, in the opinion of the sender, would be likely to throw light on the inquiry.

Parcels or letters containing seeds or plants for examination (carriage or postage paid) must be addressed to Professor M‘Alpine, Botanical Laboratory, 6 Blythswood Square, Glasgow.

INSECT PESTS.

Arrangements have been made with Mr R. Stewart MacDougall M.A., D.Sc., Edinburgh, to advise members of the Society regarding insects or allied animals which, in any stage of their development, infest—

(*a*) Farm crops.
(*b*) Stored grain.
(*c*) Garden and greenhouse plants.
(*d*) Fruit and fruit trees.
(*e*) Forest trees and stored timber.
(*f*) Live stock (including poultry).

Members consulting Dr MacDougall will please forward with their queries examples of the injured plants, or the injured parts of plants, &c., as well as specimens of the insects or other animals believed to be the cause of the injury.

Specimens should be sent in tin or wooden boxes, or in quills, to prevent injury in transmission.

Address letters and parcels (carriage or postage paid) to Dr R. Stewart MacDougall, 13 Archibald Place, Edinburgh.

The Directors have fixed the fee payable by members to Dr MacDougall at 1s. for each case upon which he is consulted: this fee must be sent to him along with the application for information.

PREMIUMS

GENERAL REGULATIONS FOR COMPETITORS.

1. It is to be distinctly understood that the Society is not responsible for the views, statements, or opinions of any of the writers whose papers are published in the 'Transactions.'

2. All reports must be legibly written, and on one side of the paper only; they must specify the number and subject of the Premium for which they are in *competition*; they must bear a distinguishing motto, and be accompanied by a sealed letter, similarly marked, containing the name and address of the reporter—initials must not be used.

3. No sealed letter, unless belonging to a report found entitled to the Premium offered, or a portion of it, will be opened without the author's consent.

4. Reports for which a Premium, or a portion of a Premium, has been awarded, become the property of the Society, and cannot be published in whole or in part, nor circulated in any manner, without the consent of the Directors. All other papers will be returned to the authors if applied for within twelve months.

5. The Society is not bound to award the whole or any part of a Premium.

6. All reports must be of a practical character, containing the results of the writer's own observation or experiment, and the special conditions attached to each Premium must be strictly fulfilled. General essays, and papers compiled from books, will not be rewarded or accepted. Weights and measurements must be indicated by the imperial standards.

7. The Directors, before or after awarding a Premium, shall have power to require the writer of any report to verify the statements made in it.

8. The decisions of the Board of Directors are final and conclusive as to all matters relating to Premiums, whether for Reports or at General or District Shows; and it shall not be competent to raise any question or appeal touching such decisions before any other tribunal.

9. The Directors will welcome papers from any Contributor on any suitable subject, whether included in the Premium List or not; and if the topic and the treatment of it are both approved the writer may be remunerated and his paper published.

CLASS I.

REPORTS.

SECTION 1.—THE SCIENCE AND PRACTICE OF AGRICULTURE.

FOR APPROVED REPORTS.

1. On any useful practice in Rural Economy adopted in other countries, and susceptible of being introduced with advantage into Scotland—The Gold Medal. To be lodged by 1st November in any year.

The purpose chiefly contemplated by the offer of this premium is to induce travellers to notice and record such particular practices as may seem calculated to benefit Scotland. The Report to be founded on personal observation.

2. Approved Reports on other suitable subjects. To be lodged by 1st November in any year.

SECTION 2.—ESTATE IMPROVEMENTS.

FOR APPROVED REPORTS.

1. By the Proprietor in Scotland who shall have executed the most judicious, successful, and extensive Improvement—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November in any year.

Should the successful Report be written for the Proprietor by his resident factor or farm manager, a Minor Gold Medal will be awarded to the writer in addition to the Gold Medal to the Proprietor.

The merits of the Report will not be determined so much by the mere extent of the improvements, as by their character and relation to the size of the property. The improvements may comprise reclaiming, draining, enclosing, planting, road-making, building, and all other operations proper to landed estates. The period within which the operations may have been conducted is not limited, except that it must not exceed the term of the Reporter's proprietorship.

2. By the Proprietor or Tenant in Scotland who shall have reclaimed within the ten preceding years not less than forty acres of Waste Land—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November in any year.

3. By the Tenant in Scotland who shall have reclaimed within the ten preceding years not less than twenty acres of Waste Land

—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November in any year.

4. By the Tenant in Scotland who shall have reclaimed not less than ten acres within a similar period—The Medium Gold Medal, or Five Sovereigns. To be lodged by 1st November in any year.

The Reports in competition for Nos. 2, 3, and 4 may comprehend such general observations on the improvement of waste lands as the writer's experience may lead him to make, but must refer especially to the lands reclaimed—to the nature of the soil—the previous state and probable value of the subject—the obstacles opposed to its improvement—the details of the various operations—the mode of cultivation adopted—and the produce and value of the crops produced. As the required extent cannot be made up of different patches of land, the improvement must have relation to one subject; it must be of profitable character, and a rotation of crops must have been concluded before the date of the Report. *A detailed statement of the expenditure and return* and a certified measurement of the ground are requisite.

5. By the Proprietor or Tenant in Scotland who shall have improved within the ten preceding years the Pasturage of not less than thirty acres, by means of top-dressing, draining, or otherwise, without tillage, in situations where tillage may be inexpedient—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November in any year.

6. By the Tenant in Scotland who shall have improved not less than ten acres within a similar period—The Minor Gold Medal. To be lodged by 1st November in any year.

Reports in competition for Nos. 5 and 6 must state the particular mode of management adopted, the substances applied, the elevation and nature of the soil, its previous natural products, and the changes produced.

SECTION 3.—HIGHLAND INDUSTRIES AND FISHERIES.

FOR APPROVED REPORTS.

1. The best mode of treating native Wool; cleaning, carding, dyeing, spinning, knitting, and weaving by hand in the Highlands and Islands of Scotland—Five Sovereigns. To be lodged by 1st November in any year.

SECTION 4.—MACHINERY.

FOR APPROVED REPORTS.

To be lodged by 1st November in any year

SECTION 5.—FORESTRY DEPARTMENT.

FOR APPROVED REPORTS.

1. On Plantations of not less than eight years' standing formed on deep peat-bog—The Medium Gold Medal, or Five Sovereigns. To be lodged by 1st November in any year.

The premium is strictly applicable to deep peat or flow moss; the condition of the moss previous to planting, as well as at the date of the Report, should, if possible, be stated.

The Report must describe the mode and extent of the drainage, and the effect it has had in subsiding the moss—the trenching, levelling, or other preliminary operations that may have been performed on the surface—the mode of planting—kinds, sizes, and number of trees planted per acre—and their relative progress and value, as compared with plantations of a similar age and description grown on other soils in the vicinity.

CLASS II.

DISTRICT COMPETITIONS.

REGULATIONS 1906.

Grants in aid of DISTRICT COMPETITIONS *for* 1907 *must be applied for before* 1*st November* 1906, *on Forms to be obtained from the Secretary.*

When a Grant has expired, the District cannot apply again for aid for four years.

SECTION I.—GRANTS TO DISTRICT SOCIETIES FOR HORSES, CATTLE, SHEEP, AND PIGS.

1. CLASS OF STOCK—LIMIT OF GRANTS, £340.—The Highland and Agricultural Society will make Grants to District Societies for prizes for *Breeding Animals* of any of the following Classes of Stock, viz:—

Cattle.

Shorthorn.
Aberdeen-Angus.
Galloway.
Highland.
Ayrshire.
Jersey.

Horses.

Draught Horses.
Hunters.
Hackneys.
Ponies.
Shetland Ponies.

Sheep.

Blackface.
Border Leicester.
Half-Bred.
Shropshire.
Oxford Down.
Suffolk.
Wensleydale.

Swine.

Any Pure Breed.

Cross-bred animals are not eligible. The Prizes must be confined to *Breeding* Animals; "bullocks," "geldings," "wethers," and "hog pigs" are excluded.

2. GRANT TO DISTRICT, £12.—The portion of the Grant to any one District Society shall not exceed the sum of £12 in any one year.

3. ALLOCATION OF GRANT.—The Grant from the Highland and Agricultural Society is not to be applied as a Grant in aid of the Premiums offered by the Local Society, but must be offered in the form of separate Prizes for the Animals chosen; *and the Prizes must be announced in the Premium List and Catalogue of the Show as "given by the Highland and Agricultural Society."*

4. CONTINUANCE OF GRANT THREE YEARS.—The Grant shall continue for three alternate years, provided always that the District Society shall, in the two intermediate years, continue the competition by offering Premiums for the same class of Stock as that selected in each previous year to compete for the Highland and Agricultural Society's Prizes. If no competition takes place for two years the Grant expires.

5. When it is agreed to hold the General Show of the Society in any district, no provincial show shall be held in that district in the months of June, July, or August.

6. MEDALS.—In the two alternate years the Highland and Agricultural Society will place three Silver Medals at the disposal of the District Societies, for the same classes of Stock as those for which the Money Premiums are offered, provided that not less than three lots are exhibited in the same class.

7. RULES OF COMPETITION.—The Rules of Competition for the Premiums, the Funds for which are derived from Grants of the Highland and Agricultural Society, shall be such as are generally enforced by the Society receiving the Grant for Premiums offered by itself.

8. AREA AND PARISHES—FIVE PARISHES.—When making application for Grants from the Highland and Agricultural Society, the District Society must delineate the area and the number of parishes comprised in the district, and, *except in special cases*, no District Society shall be entitled to a Grant whose show is not open to at least *five* Parishes.

9. REPORTS.—Blank Forms for Reports will be furnished to the Secretaries of the different District Societies. Both in the years when the Grant is offered and in the two intermediate years, detailed reports of the competition must be given on these Forms and lodged with the Secretary of the Highland and Agricultural Society as soon as possible after the Show, and in no case later than 1st November. These reports are subject to the approval of the Directors of the Highland and Agricultural Society, against whose decision there shall be no appeal. All Reports must be signed and certified as marked in the Form.

10. GRANTS—WHEN PAID.—The Grants made to District Societies will be paid in December after the Reports of the awards of the prizes have been received and found to be in order and passed by the Board of Directors, the Money Grants being paid to the Secretaries of the Local Societies and the Medals sent direct to the winners. *The Secretary of the District Society must not on any condition whatever pay any premium offered by the Highland and Agricultural Society until he has been informed that the awards are in order and has received the Grant from the Highland and Agricultural Society.*

11. RENEWAL OF APPLICATION.—No application for renewal of a Grant to a District Society will be entertained until the expiration of *four years* from the termination of the last Grant.

12. DISPOSAL OF APPLICATIONS.—In disposing of applications for District Grants, the Directors of the Highland and Agricultural Society shall keep in view the length of interval that has elapsed since the expiration of the last Grant, giving priority to those District Societies which have been longest off the list.

DISTRICTS.

1. United East Lothian.—*Convener*, William Gillespie, Athelstaneford Mains, Drem; *Secretary*, John Stirling, Solicitor, Haddington. Granted 1902.
2. Lochaber.—*Convener*, R. E. Jones, Fassifern, Fort William; *Secretary*, N. B. Mackenzie, jun., Estate Office, Fort William. Granted 1902.
3. Strathendrick.—*Convener and Secretary*, W. Watson Murray, Catter House, Drymen. Granted 1902.
4. Strathbogie.—*Convener*, Charles Kemp of Auchencrieve, Rothiemay; *Secretary*, J. G. Stewart, Huntly. Granted 1901. (In abeyance in 1902 on account of the Aberdeen Show.)
5. Dumfries.—*Convener*, C. E. Galbraith, Terregles, Dumfries; *Joint-Secretaries*, J. M'Kechnie, North of Scotland Bank, Dumfries, and John Wilson, Boghead. Granted 1901. (In abeyance in 1903 on account of the Dumfries Show.)
6. Islay, Jura, and Colonsay.—*Convener*, John Laughton, Ellabus, Islay; *Secretary*, Robert Cullen, Solicitor, Bridgend, Islay. Granted 1901. (In abeyance in 1905 on account of the Glasgow Show.)
7. Arran.—*Convener*, James Allan, Balnacoole, Shiskine; *Secretary*, William Brown, Shedock, Shiskine. Granted 1901. (In abeyance in 1905 on account of the Glasgow Show.)
8. Inverness-shire.—*Convener*, J. Huntly Macdonald, Charleston, Inverness; *Secretary*, D. Gray, 36 Union Street, Inverness. Granted 1903. (In abeyance in 1903. Grant given to the Joint Show.)
9. Kincardineshire. — *Convener*, C. A. Preddy, Arbuttnott House, Drumlithie; *Secretary*, A. B. Annandale, Stonehaven. Granted 1904.
10. Buchlyvie and Gartmore. — *Convener*, Paul Hendry, Gartmore, Port of Menteith; *Secretary*, Daniel Fisher, Garchel, Buchlyvie. Granted 1904.
11. Perthshire. — *Convener*, David Dow, Balmanno, Bridge of Earn; *Secretary*, John F. Smith, Eastfield, Bridge of Earn. Granted 1903. (In abeyance in 1904 on account of the Perth Show.)
12. Carrick.—*Convener*, Alex. Cross of Knockdon, 19 Hope Street, Glasgow; *Joint-Secretaries*, David Brown and Charles W. Brown, Royal Bank, Maybole. Granted 1903. (In abeyance in 1905 on account of the Glasgow Show.)
13. Cumnock.—*Convener*, James Clark, Crossflatt, Muirkirk; *Secretary*, David Stevenson, Changue, Cumnock. Granted 1903. (In abeyance in 1905 on account of the Glasgow Show.)
14. Upper Ward of Lanarkshire.—*Convener*, John Morton, Whelphill, Abington, Lanark; *Secretary*, W. D. Brown, Ferniclea, Lanark. Granted 1903. (In abeyance in 1905 on account of the Glasgow Show.)
15. Aberdour.—*Convener*, Alex. Lovie, Nether Boyndlie, Fraserburgh; *Secretary*, William Chapman, Woodhead, New Aberdour. Granted 1906.
16. Royal Northern.—*Convener*, George J. Walker, Hillside House, Portlethen; *Secretary*, Robert R. Ross, Balmoral Buildings, 67 Green, Aberdeen. Granted 1906.
17. Nether Lorn.—*Convener*, Allan Hall, Degnish, Ardmaddy, Oban; *Secretary*, Hugh M. Campbell, Estate Office, Kilbrandon, Oban. Granted 1906.

18. Dunblane.—*Convener*, A. H. Anderson, Kippendavie Estate Office, Dunblane; *Secretary*, James Barty, Solicitor, Dunblane. Granted 1906.

19. Deeside Union.—*Convener*, Lieut.-Col. Innes of Learney, Torphins; *Joint-Secretaries*, John Davidson and John Cooper, Banchory. Granted 1903.

20. Turriff.—*Convener*, James Beaton, Aspen Bank, Turriff; *Secretary*, R. Cruickshank, Claymires, Turriff. Granted 1903.

21. Marnoch and Cornhill.—*Convener*, James O. Morrison of Culvie, Tipperty, Banff; *Secretary*, Douglas B. Leask, North of Scotland Bank, Aberchirder. Granted 1903.

22. Kirkintilloch.—*Convener*, Alex. Park, 175 Hope Street, Glasgow; *Secretary*, Andrew Matson, National Bank, Kirkintilloch. Granted 1903.

23. Ardoch.—*Convener*, George Nairn, Boreland, Blackford; *Secretary*, W. M. Jeffrey, Solicitor, Auchterarder. Granted 1903.

24. Eastern District of Stirlingshire.—*Convener*, Robert Meikle, Bearcrofts, Grangemouth; *Secretary*, James Learmonth, 10 Newmarket Street, Falkirk. Granted 1903.

25. Castle Douglas.—*Convener*, John M'Kie of Bargaly, Ernespie, Castle Douglas; *Secretary*, Malcolm M'L. Harper, British Linen Co. Bank, Castle Douglas. Granted 1902. (In abeyance in 1903 on account of the Dumfries Show.)

26. United Banffshire.—*Convener*, William MacIntosh, Factor, Banff; *Secretary*, John A. Badenoch, Accountant, Banff. Granted 1905.

27. Caithness.—*Convener*, Lieut.-Col. J. H. Henderson, Bellevue, Wick; *Secretary*, George Harrold, Accountant, Wick. Granted 1905.

28. Annandale Union.—*Convener*, James Lindsay, Whitecastles, Lockerbie; *Secretary*, John A. Mackenzie, Solicitor, Lockerbie. Granted 1905.

29. Dalkeith.—*Convener*, James Cook, Arniston, Gorebridge; *Secretary*, T. Watson Dods, Auctioneer, Dalkeith. Granted 1905.

30. Morayshire.—*Convener*, Colonel C. J. Johnston of Lesmurdie, Elgin; *Secretary*, W. Rose Black, Town and County Bank, Elgin. Granted 1905.

31. Angus.—*Convener*, David Hume, Barrelwell, Brechin; *Secretary*, James Kydd, 86 High Street, Arbroath. Granted 1905.

32. Spey, Aven, and Fiddochside.—*Convener*, Sir George Macpherson Grant of Ballindalloch, Bart.; *Secretary*, Robert Dick Stuart, Seafield Square, Rothes. Granted 1905.

33. Western District of Fife.—*Convener*, James Auchterlonie, Leckerstone, Dunfermline; *Secretary*, Robert Husband, 1 Douglas Street, Dunfermline. Granted 1905.

34. Dalbeattie.—*Convener*, W. J. H. Maxwell of Munches, Dalbeattie; *Secretary*, J. E. Milligan, Solicitor, Dalbeattie. Granted 1905.

35. West Lothian.—*Convener*, Marquis of Linlithgow; *Secretary*, Archibald Cochrane, Trinlaymire, Linlithgowshire. Granted 1905.

36. Black Isle.—*Convener*, Major Matheson, Insch, Avoch; *Secretary*, Allan MacDonald, Bank Agent, Fortrose. Granted 1904. (In abeyance in 1905 on account of the Joint Show.)

37. Forth.—*Convener*, David M'Culloch, The Inn, Forth; *Secretary*, James Barrie of Mossplat, Carstairs. Granted 1904. (In abeyance in 1905 on account of the Glasgow Show.)

38. New Monkland.—*Convener*, John W. Findlay, 4 Bank Street, Airdrie; *Secretary*, John A. White, Royal Bank, Airdrie. Granted 1904. (In abeyance in 1905 on account of the Glasgow Show.)

39. West Teviotdale.—*Convener*, James Elliot, Flex, Hawick; *Secretary*, James Oliver, Thornwood, Hawick. Granted 1903. (In abeyance in 1906 on account of the Peebles Show.)

In 1906.

Nos. 1, 2, 3, 4, 5, 6, and 7 are in competition for the last year.
Nos. 8, 9, 10, 11, 12, 13, and 14 are in competition for the second year.
Nos. 15, 16, 17, and 18 are in competition for the first year.
Nos. 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, and 38 compete for local Premiums.
No. 39 is in abeyance on account of the Peebles Show.

Section 2.—GRANTS TO HORSE ASSOCIATIONS, &c., FOR STALLIONS FOR AGRICULTURAL PURPOSES.

1. Horses—Limit of Grant, £210.—The Highland and Agricultural Society will make Grants to Horse Associations and other Societies in different districts engaging Stallions for agricultural purposes. The total sum expended by the Highland and Agricultural Society in such Grants shall not exceed the sum of £210 in any one year.

2. Grant to each, £15.—The portion of the Grant to any one Horse Association, &c., shall not exceed the sum of £15 in any one year.

3. Continuance of Grant Three Years—Intermediate Year.—The Grant shall continue for three alternate years, provided always that the Horse Association or Society shall, in the two intermediate years, offer at least a sum equal in amount to that granted by the Highland and Agricultural Society for the hire of a Horse in connection with the Association or Society to whom the Grant is made.

4. Penalty for not engaging Horse.—In the event of a Horse not being engaged in any one year while the provisions of the Grant are in force, the Grant made by the Highland and Agricultural Society will cease.

5. Rules 9 (Reports), 10 (Time of Payment), 11 (Renewal of Grant), and 12 (Disposal of Applications) applicable to Section 1, shall be applicable to Section 2.

DISTRICTS.

1. Deeside Horse-Breeding Association.—*Convener*, Sir Thomas Burnett of Leys, Bart., Crathes Castle; *Secretary*, John Cooper, Ley, Banchory. Granted 1902.
2. Vale of Alford Horse-Breeding Society.—*Convener*, William A. Mitchell, Auchnagathle, Whitehouse, Aberdeen; *Secretary*, John Reid, Balquharn, Alford, N.B. Granted 1902.
3. Clackmannanshire Union.—*Convener*, William M'Gregor, Arns, Alloa; *Secretary*, Alex. L. Roxburgh, 28 Mar Street, Alloa. Granted 1902.
4. Lockerbie Entire Horse Society.—*Convener*, Allan Murray, Castlemilk Mill, Lockerbie; *Secretary*, James R. Byers, Solicitor, Lockerbie. Granted 1902.

5. East of Fife Entire Horse Society.—*Convener*, J. Brewster, Denburn, Crail; *Secretary*, William Rutherford, Thirdpart, Crail. Granted 1902.
6. Windygates.—*Convener*, R. M. Pilkington, Bridgend, Windygates; *Secretary*, William Shepherd, Royal Bank, Leven. Granted 1902.
7. Inverness-shire.—*Convener*, John Shaw, Slackbuie, Inverness; *Secretary*, D. Gray, 36 Union Street, Inverness. Granted 1902.
8. Perth and Coupar-Angus Horse Improvement Society.—*Convener*, W. S. Ferguson, Pictstonhill, Perth; *Secretary*, James Stewart, Friarton, Perth. Granted 1902.
9. Insch and Garioch Horse-Breeding Society.—*Convener*, Peter Bruce, Myreton, Insch, Aberdeen; *Secretary*, George A. Bruce, Inschfield, Insch, Aberdeen. Granted 1904.
10. Upper Donside.—*Convener*, Alex. Fletcher, Glenbucket Mains, Glenbucket; *Secretary*, John Milne, Town and County Bank, Kildrummy. Granted 1904.
11. Lammermoor Pastoral.—*Convener*, George G. Turnbull of Abbey St Bathans, Grant's House; *Secretary*, Thos. Stephenson, Duns. Granted 1904.
12. Upper Nithsdale Horse Society.—*Convener*, D. M. MacRae, Stenhouse, Thornhill; *Secretary*, David Paterson, Solicitor, Thornhill. Granted 1904.
13. Central Banffshire.—*Convener*, James M'William, Honeytown, Boharm; *Secretary*, George Donald, Ladyhill, Keith. Granted 1906.
14. Dumfries and District Clydesdale Horse-Breeding Society.—*Convener*, James Brown, Burnside, Hollywood; *Secretary*, George Will, Crichton Farm, Dumfries. Granted 1906.
15. Biggar and Peebles Clydesdale Horse-Breeding Society.—*Convener*, William Noble, Lochurd, Dolphinton; *Secretary*, R. G. Murray, Spittal, Biggar. Granted 1906.
16. Strathearn.—*Convener*, Sir Charles Dundas of Dunird, Bart., Comrie; *Secretary*, A. Anderson Connon, Solicitor, Crieff. Granted 1906.
17. Gigha.—*Convener*, W. J. Yorke Scarlett of Gigha; *Secretary*, W. W. Philip, Estate Office, Gigha. Granted 1903.
18. Cumbernauld, Kilsyth, and Kirkintilloch.—*Convener*, Alexander Whitelaw of Gartshore, Kirkintilloch; *Secretary*, Alexander Park, 175 Hope Street, Glasgow. Granted 1903.
19. Gatehouse.—*Convener and Secretary*, D. Y. Veitch, Low Creoch, Gatehouse. Granted 1903.
20. Scone, Strathord, and Murthly.—*Convener*, W. S. Ferguson, Pictstonhill, Perth; *Secretary*, James Stewart, Friarton, Perth. Granted 1903.
21. Kelso District Clydesdale Horse Society.—*Convener*, W. G. Hogarth, Linton, Bankhead, Kelso; *Secretary*, A. Riddell, 3 Square, Kelso. Granted 1903.
22. Caithness Horse-Breeding Association.—*Convener*, Robert Morris, Reiss Lodge, Wick; *Secretary*, Alex. Dunnet, Upper Gillock, Wick. Granted 1905.
23. Moray Horse-Breeding Association.—*Convener*, Andrew B. Leitch, Inchstelly, Forres; *Secretary*, H. M. S. Mackay, Bank Agent, Elgin. Granted 1905.
24. Carse and Dundee District Stallion Society.—*Convener*, Captain Clayhills Henderson of Invergowrie, R.N., Dundee; *Secretary*, Alex. Anderson, Berryhill, Dundee. Granted 1905.

25. SELKIRK AND GALASHIELS. — *Convener*, Thomas D. Connochie, M.R.C.V.S., Galashiels; *Secretary*, D. C. Finlay, National Bank House, Galashiels. Granted 1905.

26. BUCHLYVIE AND VALE OF MENTEITH HORSE-BREEDING SOCIETY.— *Convener*, Stephen Mitchell of Boquhan, Kippen Station; *Secretary*, John Drysdale, Arngibbon, Port of Menteith Station. Granted 1905.

In 1906.

Nos. 1, 2, 3, 4, 5, 6, 7, and 8 are in competition for the last year.

Nos. 9, 10, 11, and 12 are in competition for the second year.

Nos. 13, 14, 15, and 16 are in competition for the first year.

Nos. 17, 18, 19, 20, 21, 22, 23, 24, 25, and 26 compete for local premiums.

SPECIAL GRANTS.

£40 to the Highland Home Industries Association.—*Joint-Secretaries*, Miss Muriel K. Mackenzie, Conon House, Conon Bridge, Ross-shire, and Miss Jessie D. C. Ross, Riverfield, Inverness. Granted 1895. (Did not hold a Competition in 1899 or 1900.)

£20 to the Ayrshire Agricultural Association, to be competed for at the Dairy Produce Show at Kilmarnock.—*Convener*, The Hon. G. R. Vernon, Auchans House, Kilmarnock; *Secretary*, John Howie, 58 Alloway Street, Ayr. Granted 1872.

£12 and two Medium Silver Medals to Island of Eday, Orkney. *Convener and Secretary*, J. B. Graham, Calf Sound, Eday, Orkney. Granted 1906.

£5 to Shetland Agricultural Society.—*Convener*, J. M. Goudie, Lerwick; *Secretary*, James J. Brown, Lerwick. Granted 1893.

£3 to Orkney.—*Convener and Secretary*, James Johnston, Orphir House, Orphir, Orkney. Granted 1883. (In abeyance in 1906.)

£3 to East Mainland, Orkney.—*Convener*, Alfred Reid, Braebuster, Kirkwall; *Secretary*, John Clouston, Graemeshall, Holm, by Kirkwall. Granted 1898. (In abeyance in 1906.)

£3 to West Mainland, Orkney.—*Convener*, W. G. T. Watt, Skaill House, Stromness; *Secretary*, John Gibson, Seatter, Stromness, Orkney. Granted 1900.

£3 to Sanday, Orkney.—*Convener*, W. Cowper Ward, Scar House, Sanday, Orkney; *Secretary*, K. H. Sinclair, Kettletoft, Sanday, Orkney. Granted 1902. (In abeyance in 1906.)

£3 to Rousay, Orkney.—*Convener*, H. H. Horne, Trumland Farm, Rousay, Orkney; *Secretary*, Alexander Learmonth, Breckon, Rousay. Granted 1903.

£3 to South Ronaldshay and Burray, Orkney.—*Convener*, Arch. Allan, St Margaret's Hope, Orkney; *Joint-Secretaries*, William Cromarty, Widewall House, and Robert Cromarty, Sandwick House, St Margaret's Hope, Orkney. Granted 1904.

North of Scotland Root, Vegetable, &c.—*Convener*, John Maitland, East Balhalgardy, Inverurie; *Secretary*, James Eddie, F.R.H.S., Inverurie. 4 Medals. Granted 1899.

MEDALS IN AID OF PREMIUMS GIVEN BY LOCAL SOCIETIES.

The Society, being anxious to co-operate with local Associations, will give a limited number of Silver Medals annually to Societies, not on the list of Cattle, Horse, or Sheep Premiums, in addition to the Money Premiums awarded in the Districts for—

1. Best Bull, Cow, or Heifer of any pure breed included in Section 1.
2. Best Stallion, or Mare of any pure breed included in Section 1.
3. Best Tup, or Pen of Ewes of any pure breed included in Section 1.
4. Best Boar, Sow, or Breeding-Pig of any pure breed.
5. Best Pens of Poultry.
6. Best Sample of any variety of Wool.
7. Best Sample of any variety of Seeds.
8. Best managed Farm.
9. Best managed Green Crop.
10. Best managed Hay Crop.
11. Best managed Dairy.
12. Best Sweet-Milk Cheese.
13. Best Cured Butter.
14. Best Fresh Butter.
15. Best collection of Roots.
16. Best kept Fences.
17. Male Farm Servant who has been longest in the same service, and who has proved himself most efficient in his duties, and to have invariably treated the animals under his charge with kindness.
18. Female Servant in charge of Dairy and Poultry who has been longest in the same service, and who has proved herself most efficient in her duties, and to have invariably treated the animals under her charge with kindness.
19. Best Sheep-Shearer.
20. Most expert Hedge-Cutter.
21. Most expert Labourer at Draining.
22. Best Maker of Oat-Cakes.

It is left to the local Society to choose out of the foregoing list the classes for which the Medals are to be competed.

The Medals are granted for two years, and lapse if not awarded in those years.

No Society shall receive more than two Medals for two years.

Aberdeenshire.

1. Cluny.—*Convener*, Ranald R. Macdonald, 16 Union Terrace, Aberdeen; *Secretary*, James Christie, Backhill, Cluny, Kemnay. 2 Medals. 1905.
2. Fyvie.—*Convener*, James Durno, Jackstown, Rothie Norman; *Secretary*, John Hay, Mill of Crichie, Fyvie. 2 Medals. 1905.
3. Strichen.—*Convener and Secretary*, John Sleigh, Strichen Mains, Strichen. 2 Medals. 1905.

Argyllshire.

4. GIGHA.—*Convener*, W. J. Yorke Scarlett of Gigha; *Secretary*, W. W. Philip, Estate Office, Gigha. 2 Medals. 1906.
5. TARBERT BRANCH OF ARGYLL CATTLE SHOW.—*Convener*, G. P. Campbell, Stonefield, Tarbert, Lochfyne; *Secretary*, James M'Dougall, Burnside, Tarbert, Lochfyne. 2 Medals. 1906.

Ayrshire.

6. DALRY.—*Convener*, Andrew C. Patrick, Greenbank, Dalry; *Secretary*, James Allan, West Kirkland, Dalry. 2 Medals. 1906.
7. FENWICK.—*Convener*, James Dunlop, Gree Farm, Fenwick; *Secretary*, James Dunlop, Midlands, Fenwick. 2 Medals. 1906.

Banffshire.

8. NORTHERN SEEDS AND ROOTS ASSOCIATION. — *Convener*, Robert Turner, Cairnton, Boyndie; *Secretary*, James Young, 28 Seafield Street, Portsoy. 2 Medals. 1906.

Dumfriesshire.

9. SANQUHAR.—*Convener*, Robert Dalgleish, Ulzieside, Sanquhar; *Secretary*, Wm. Murray, British Linen Co. Bank, Sanquhar. 2 Medals. 1905.

Elginshire.

10. STRATHSPEY.—*Convener*, John Smith, Inverallan, Grantown; *Secretary*, D. G. Lawson, Parish Council Office, Grantown. 2 Medals. 1905.

Inverness-shire.

11. INVERNESS ORNITHOLOGICAL.—*Convener*, John Mackenzie, "Delny," Rangemore Road, Inverness; *Secretary*, Alex. Smith, 38 Eastgate, Inverness. 2 Medals. 1906.

Stewartry of Kirkcudbright.

12. GLENKENS.—*Convener*, J. Murray Kennedy, of Knocknalling, Dalry, Galloway; *Secretary*, Rev. P. Philip, Manse of Kells, New Galloway. 2 Medals. 1905.

Ross-shire.

13. LOCHBROOM.—*Convener*, Murdo Macleay, Broom Cottage, Lochbroom; *Secretary*, Hay Mackenzie, Banker, Ullapool. 1 Medal. 1904. (In abeyance 1905.)

Applications from other Districts must be lodged with the Secretary of the Society *by 1st November next.*

RULES OF COMPETITION.

1. All Competitions must be at the instance of a local Society.

2. The classes for which Medals are granted must be in accordance with the list at page 51. The Committee shall select the classes, and specify them in the Report.

3. A Committee of Management shall be appointed, and the Convener of the Committee must be a Member of the Highland and Agricultural Society.

4. The Money Premiums given in the District must be not less than £2 for each Medal claimed.
5. The Medal for Sheep-Shearing shall always accompany the highest Money Premium.
6. There must not be fewer than three competitors in all the classes.
7. Regarding Reports, despatch of Medals, and application for renewal of Grant, Rules 9, 10, and 11, Section I., will apply.

PLOUGHING COMPETITIONS.

The Minor Silver Medal will be given to the winner of the first Premium at Ploughing Competitions, provided a Report in the following terms is made to the Secretary, within one month of the Competition, by a Member of the Society. Forms of Report to be had on application:—

FORM OF REPORT.

I, of , Member of the Highland and Agricultural Society, hereby certify that I attended the Ploughing Match of the Association at in the county of on the when ploughs competed; of land were assigned to each, and hours were allowed for the execution of the work. The sum of £ was awarded in the following proportions, viz.:—

[*Here enumerate the names and designations of successful Competitors.*]

RULES OF COMPETITION.

1. All Matches must be at the instance of a local Society or Ploughing Association, and no Match at the instance of an individual, or confined to the tenants of one estate, will be recognised.
2. The title of such Society or Association, together with the name and address of its Secretary, must be registered with the Secretary of the Highland and Agricultural Society, 3 George IV. Bridge, Edinburgh.
3. Not more than one Match in the same season can take place within the bounds of the same Society or Association.
4. All reports must be lodged within one month of the date of the Match, and certified by a Member of the Highland and Agricultural Society who was present at it.
5. A Member can only report one Match; and a Ploughman cannot carry more than three Medals in the same season.
6. To warrant the grant of the Medal there must have been twelve ploughs in Competition, and not less than Three Pounds awarded in Prizes by the local Society. The Medal to be given to the winner of the first prize.
7. Ploughmen shall not be allowed any assistance, and their work must not be set up nor touched by others; and attention should be given to the firmness and sufficiency of the work below more than to its neatness above the surface.
8. The Local Committee is required to fix the time to be allowed for ploughing the portion of land, and they are recommended that the time be at the rate of not more than ten hours per imperial acre on light land, and fourteen hours on heavy or stony land.

CLASS III.

COTTAGES AND GARDENS.

The following Premiums are offered for Competition in the Parishes after mentioned.

The Premiums are granted for two years.

PREMIUMS FOR BEST KEPT COTTAGES AND GARDENS.

1. Best kept Cottage	£1 0 0
Second best	0 10 0
2. Best kept Cottage Garden	1 0 0
Second best	0 10 0

RULES OF COMPETITION.

1. Competitions may take place in the different parishes for Cottages and Gardens, or for either separately.

2. The occupiers of Lodges at Gentlemen's Approach Gates and Gardeners' Houses are excluded, as well as others whom the Committee consider, from their position, not to be entitled to compete. The inspection must be completed by the 1st of October. In making the inspection, the Conveners may take the assistance of any competent judges.

3. It is left to the Committee of the District to regulate the maximum annual rent of the Cottages, which may, with the garden, be from £5 to £7.

4. To warrant the award of full Premiums, there must not be fewer than three competitors in each class. If there are less than three competitors in each class, only half Premium will be awarded.

5. A person who has gained the highest Premium cannot compete again.

6. If the Cottage is occupied by the proprietor, the roof must be in good repair; if the roof is thatch, it must be in good repair, though in the occupation of a tenant. The interior and external conveniences must be clean and orderly; the windows must be free of broken glass, clean, and affording the means of ventilation. Dunghills, and all other nuisances, must be removed from the front and gables. In awarding the Cottage Premiums, preference will be given to Competitors who, in addition to the above requisites, have displayed the greatest taste in ornamenting the exterior of their houses, and the ground in front and at the gables.

7. In estimating the claims for the Garden Premiums, the judges should have in view—the sufficiency and neatness of the fences and walks; the cleanness of the ground; the quality and choice of the crops; and the general productiveness of the garden.

8. Reports, stating the number of Competitors, the names of successful parties, and the nature of the exertions which have been made by them, must be lodged with the Secretary of the Highland and Agricultural Society *on or before the* 1*st November next.*

9. When a grant has expired, the District cannot apply again for aid for four years.

Parishes desirous of these Premiums must lodge applications with the Secretary *on or before the* 1*st November next.*

MEDALS FOR COTTAGES AND GARDENS OR GARDEN PRODUCE AND BEE-KEEPING.

1. The Society will give annually one or two Minor Silver Medals to a limited number of local Associations or individuals, who establish Competitions and Premiums for Cottages, Gardens, Garden Produce, or Bee-Keeping. The Medals will be granted for two years.

2. The Medals may be offered in any two of the following sections, *but under no circumstances will the two Medals be given in one of the sections:—*

(1) Best kept Cottage or best kept Cottage and Garden. (One Medal only.)

(2) Best kept Garden. (One Medal only.)

(3) Best Collection of Garden Produce—Flowers excluded. (One Medal only.)

(4) Honey. (One Medal only.)

3. The annual value of each Cottage, with the ground occupied in the parish by a Competitor, must not exceed £15. The occupiers of Lodges at Gentlemen's Approach Gates, and Gardeners in the employment of others, are not entitled to compete.

4. If Competition takes place for Garden Produce, such produce must be *bona fide* grown in the Exhibitor's Garden. He will not be allowed to make up a collection from any other Garden. The produce must consist of Vegetables or Vegetables and Fruit (not Fruit alone). Flowers are excluded.

5. The Honey must be the produce of the Exhibitor's own Hives.

6. To warrant the award of a Medal, there must not be fewer than three Competitors.

7. Blank forms for Reports of Competitions will be furnished to the Secretaries of the different Districts. These must, in all details, be completed and lodged with the Secretary of the Highland and Agricultural Society as soon as possible after the Show, and in no case later than *1st November*, for the approval of the Directors, against whose decisions there shall be no appeal.

8. When a grant has expired, the District cannot apply again for aid for four years, and if no competition takes place in a District for two years the grant expires.

9. Applications for these Medals must be made *before* 1st *November next.*

Ayrshire.

1. CUMNOCK.—*Convener*, William Hill, Hartfield, Cumnock; *Secretary*, D. C. Smith, Square, Cumnock. 2 Medals. 1906.

Edinburghshire.

2. CURRIE.—*Convener*, Thos. B. Clark, Newmills, Balerno; *Secretary*, James Millar, Currie. 2 Medals. 1905.

Fifeshire.

3 LESLIE.—*Convener*, Robt. Ritchie, Prinlaws, Leslie; *Secretary*, Andrew Dewar, Croft, Leslie. 2 Medals. 1904. (No Show in 1905.)

Haddingtonshire.

4. EAST LOTHIAN.—*Convener*, W. Murray, Solicitor, Haddington; *Secretary*, Thos. Cruickshank, City Bank Chambers, Haddington. 2 Medals. 1906.

Kinross-shire.

5. Bishopshire.—*Convener*, John Blyth, Kinnesswood, Kinross; *Secretary*, Andrew Mitchell, Schoolhouse, Scotlandwell, Leslie. 2 Medals. 1905.

Stewartry of Kirkcudbright.

6. Kirkpatrick-Durham.—*Convener*, John Gibson, Barncailzie Hall, Dalbeattie; *Secretary*, David C. G. Johnston, Kirkpatrick-Durham, Dalbeattie. 2 Medals. 1906.
7. South of Scotland Bee-Keepers.—*Convener*, John Ross, Barkerland House, Dumfries; *Secretary*, Q. Aird, Hardgate Schoolhouse, Dalbeattie. 2 Medals. 1906.

Lanarkshire.

8. Carnwath.—*Convener*, Thos. Jackson, Carnwath; *Secretary*, Geo. C. Murray, Schoolhouse, Carnwath. 2 Medals. 1905.

Orkney.

9. Orkney.—*Convener*, Colonel Bailey, Dundas Crescent, Kirkwall; *Secretary*, George M. Louttit, County Buildings, Kirkwall. 2 Medals. 1905.

Perthshire.

10. Braco.—*Convener*, James B. Macowan, M.A., Schoolhouse, Braco; *Secretary*, W. Macildowie, Crofthead, Braco. 2 Medals. 1905.
11. Dunning.—*Convener*, Robert Gardiner, Henhill, Forteviot; *Secretary*, Johnstone Wright, Burnbank, Dunning. 2 Medals. 1905.
12. Menzies.—*Convener*, Rev. R. G. Dunbar, The Manse, Weem, Aberfeldy; *Secretary*, James Adamson, The Schoolhouse, Dull, Aberfeldy. 2 Medals. 1906.

Ross-shire.

13. Lewis.—*Convener and Secretary*, Major Duncan Matheson of Lewis, Lewis Castle, Stornoway. 2 Medals. 1905.

Stirlingshire.

14. Campsie.—*Convener*, Wm. R. Richmond, Muckcroft Cottage, Lennoxtown; *Secretary*, James Young, Crosshill Street, Lennoxtown. 2 Medals. 1905.

Wigtownshire.

15. Newton-Stewart, Minnigaff and District.—*Convener*, ; *Secretary*, Alex. S. Morton, Solicitor, Newton-Stewart. 2 Medals. 1905. (In abeyance 1905.)

FIRST EDITION.]

NOTE.—From 12th till 20th July all communications should be addressed to the "Secretary's Office, Showyard, Peebles."

Address for Telegrams—"SOCIETY," EDINBURGH.

Subject to Orders issued by the Board of Agriculture

HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND

GENERAL SHOW OF STOCK AND IMPLEMENTS, PEEBLES,

ON 17TH, 18TH, 19TH, AND 20TH JULY 1906

LAST DAYS OF ENTRY.

IMPLEMENTS AND OTHER ARTICLES—Monday, 14th May.

STOCK, POULTRY, AND DAIRY PRODUCE—Friday, 8th June.

No Entry at ordinary fees taken later than those which are received at the Society's Office, Edinburgh, by first post, or 10 o'clock, on Friday morning (8th June). Post Entries for Cattle, Horses, Sheep, and Swine taken on payment of 10s. additional for each entry (Poultry at double fees) till Wednesday morning (13th June), at the Society's Office, Edinburgh, at 10 o'clock.

President of the Society.
SIR WALTER THORBURN.

Chairman of the Board of Directors.
DAVID WILSON, ESQ., D.SC., OF CARBETH

Convener of the Local Committee.
C. H. SCOTT PLUMMER, ESQ. OF SUNDERLAND HALL

The District connected with the Show comprises the Counties of Berwick, Roxburgh, Peebles, and Selkirk.

REGULATIONS.

GENERAL CONDITIONS.

1. The Competition, except where otherwise stated in the Premium List, is open to Exhibitors from all parts of the United Kingdom.

2. Every Lot must be intimated by a Certificate of Entry, lodged with the Secretary *not later than Monday,* 14*th May, for Implements and other* *Entries.*

Articles, and Friday, 8th June, for Stock, Poultry, and Dairy Produce. No Entry taken at ordinary fees later than those which are received at the Society's Office by first post, or 10 o'clock, on Friday morning, 8th June. Post Entries for Cattle, Horses, Sheep, and Swine taken on payment of 10s. additional for each entry (Poultry at double fees) till Wednesday morning (13th June), at the Society's Office, Edinburgh, at 10 o'clock. Printed forms of Entry will be issued on application to the Secretary, No. 3 George IV. Bridge, Edinburgh. Admission Orders for Exhibits and Attendants will be forwarded to Exhibitors, by post, previous to the Show.

Licences for moving Stock.

3. This Premium List is published and the Show will be held subject to any Orders that may be issued by the Board of Agriculture or Local Authorities. Any licences that may be required for the movement of Stock into or away from the Show must be obtained by Exhibitors. For licences or forms to be obtained for this Show, application should be made to J. Ramsay Smith, Esq., County Clerk, Peebles.

4. No Entry can be received or recorded unless it is accompanied by the necessary fees, and complies fully with the Regulations in the Premium List.

Particulars of Entries.

5. The Schedule of Entry must be filled up so far as within the knowledge of the Exhibitor. The Society shall have power at any time to call upon an Exhibitor to furnish proof of the correctness of any statement in his entry.

6. The name of the Breeder, if known, must be given, and if the Breeder is not known, a declaration to that effect, signed by the Exhibitor, must be made on the Entry Schedule, and no pedigree will be entered in the Catalogue when the Breeder is unknown.

No substitution of Animals.

7. All animals, except calves, foals, and lambs shown with their dams, must be entered in the classes applicable to them, and cannot be withdrawn after entry, or other animals be substituted in their place.

One Class only.

8. For prizes given by the Society, no animal shall be allowed to compete in more than one class, or to compete in any class except that prescribed for animals of its pedigree and description; but this Rule does not apply to the Jumping and Driving Competitions.

Ownership.

9. All stock exhibited at the Show, except where otherwise stated in the Premium List, must be from the time of entry to the date of the competition the *bona fide* property of the Exhibitor in whose name it is entered.

Responsibility for Entries.

10. Exhibitors are alone responsible for the accuracy and eligibility of their entries. The recording of an entry or the admission of the exhibit to the Showyard will not relieve the Exhibitor of this responsibility. The entry-fee paid for an animal entered in a class for which it is not eligible is not returnable.

Society not liable.

11. The Society shall not be liable for any loss or damage which Stock, Poultry, Dairy Produce, Implements, or other articles may sustain at the Show, or in transit.

Disqualified Exhibitors.

12. The Society reserve to themselves the right of refusing, cancelling, or prohibiting the exhibition of entries from any person who, after 1st January 1904, has been expelled from the membership of any Agricultural or Dairy Society, or who may have been prohibited, suspended, or disqualified from making entries or exhibiting at the Show or Shows of any Agricultural or Dairy Society or Breed Society in consequence of having attempted to obtain a Prize by giving a false Certificate, or by other unfair means, or who is under exclusion from any Breed Society for fraudulent practices.

Animal disqualified.

13. When an animal has previously been disqualified by the decision of any Agricultural Society in the United Kingdom, such disqualification shall attach, if the Exhibitor, being aware of the disqualification, fail to

state it, and the grounds thereof, in his entry, to enable the Directors to judge of its validity.

Tampering with Animals. 14. Any artificial contrivance or device of any description found on or proved to have been used on an animal, either for preventing the flow of milk or for any other improper purpose, will disqualify that animal from being awarded a Premium, and the Owner of said animal may be prohibited from again entering Stock for any of the Society's General Shows, for such a period as the Directors may see fit.

Rejecting Entries. 15. The Society further reserve to themselves the right of refusing any entries they may think fit to exclude, or to cancel any entry made, or to prohibit the exhibition of any entry.

Control of Exhibits. 16. Stock entered for competition, and actually in the Show, is subject to the control and under the orders of the Stewards, Secretary, and other Show officials of the Society, and such stock may not be withdrawn from competition without the consent of the Stewards or Secretary.

Improper Conduct. 17. Persons making insulting remarks to, or in any way unduly interfering with, the Judges, Stewards, or other officials while in the performance of their duties, and all Exhibitors or others in charge of stock while in the judging rings refusing to accept or display tickets, rosettes, &c., awarded by the Judges, and handed to them by the Stewards or other officials, or tearing up tickets, rosettes, &c., so awarded and handed to them, or of any similar conduct, shall be considered guilty of misconduct, and shall be dealt with under these rules.

Subject to Orders. 18. All persons in charge of stock or other exhibits, and all persons admitted into the Showyard, shall be subject to the rules of the Society, and shall obey the orders of the Stewards, Secretary, and other officials of the Society. Exhibitors shall be answerable for the conduct of their servants or representatives.

Power of Officials. 19. The Stewards and other officials have power to enforce the regulations of the Society in their different departments.

Protests. 20. A protest having reference to exhibits at the Show may be lodged by any person having interest. Protests having reference to competitions which take place on the first day of the Show must be lodged in writing with the Secretary at his Office in the Showyard not later than 9 A.M. on Wednesday, the second day of the Show, and parties must be in attendance at the Secretary's Office in the Showyard at 9.30 A.M. that day, when protests may be disposed of. Protests relating to competitions taking place after the first day of the Show must be lodged before 5 P.M. on the day on which the particular exhibition takes place. Each protest must state specifically the grounds of objection, and must be accompanied by a deposit of £2, 2s., which deposit may, if the objection be proved frivolous to the satisfaction of the Directors, be forfeited. Protests may be lodged at any time by Directors, and in this case no deposit will be required. Protests will be heard and determined by the Directors.

Penalties for Offences. 21. The violation of any one of the regulations, or disobedience of the orders of the Directors, Stewards, Secretary, or other officials of the Society, shall render the offending person liable to the forfeiture of all premiums awarded to him, or of such a portion as the Directors may ordain, and also liable to be expelled from the membership of the Society, and disqualified from again, or for a certain number of years, exhibiting at the Shows of the Society, or to have his case disposed of by fine or otherwise as the Directors may determine.

Final Authority. 22. The decision of the Directors shall, in every matter arising at or in connection with the Show, be final; and every person present at the Show, whether as a Judge, Exhibitor, Visitor, or otherwise, shall be deemed thereby to have agreed to refer the subject-matter of such decision to the final determination of the Directors, to the exclusion of all Courts of Law.

Intimating Decisions. 23. All decisions under these rules may, along with the names and addresses of the persons against whom such decisions have been pronounced, be communicated by the Secretary of this Society to the Secretaries of all Agricultural or Dairy Societies holding open Shows in the said United Kingdom, and to the Secretaries of all Breed Societies in said United Kingdom, and may be published in the Annual Reports of this Society, and in such newspapers or journals as the Directors may determine; and every Exhibitor competing at the Show, and every person present at the Show, whether as a Director, Member of Committee, Steward, Judge, Exhibitor, Visitor, or otherwise, shall be deemed thereby to have consented to such communication and publication.

Former Winners. 24. An animal which has gained a first Premium, or which subsequently becomes entitled to a first Premium, at a General Show of the Society cannot again compete in the same class, notwithstanding any alteration in the heights stated for such class, but may be exhibited as Extra Stock.

Herd-books. 25. Shorthorn, Aberdeen-Angus, Galloway, and West Highland animals must be entered in the herd-books, or the Exhibitor must produce evidence that his animal is eligible to be entered therein.

Height of Horses. 26. All Horses or Ponies entered in classes in which a particular height is stated shall before being judged be measured with their shoes on. No subsequent measuring or alteration of shoes will be permitted.

Overfeeding. 27. Breeding Stock must not be shown in an improper state of fatness, and the Judges are requested not to award Premiums to overfed animals; and no Cattle or Sheep which after the age of twelve months have been exhibited as Fat Stock at any Show are eligible to compete in the Breeding Classes for the Society's Prizes.

Sires. 28. Aged Bulls and Stallions must have had produce, and, along with two-year-old Bulls, three-year-old Colts, and two-shear and aged Tups, have served within the twelve months immediately preceding the Show.

Cows. 29. Except as may be otherwise specially provided in this Premium List, cows of all breeds must have had a calf within nine months previous to the Show, and when exhibited must be in milk. Animals of any age that have had a calf must be shown as Cows.

In-calf Heifers. 30. Two-year-old Heifers of the Shorthorn, Aberdeen-Angus, and Galloway breeds, two-year-old Yeld Ayrshire Heifers, and three-year-old Highland Heifers, must be in calf when exhibited, and the Premiums will be withheld till birth be certified, which must be within 9 months after the Show.

Mares. 31. A Mare entered in a class for "Mares with foal at foot" must have produced a foal after 1st January of the year of the Show, must have regularly nursed her own or another foal, and must have the foal with her in the Show. If the mare's own foal is alive it must be the foal shown with the mare. In the case of a Mare that has not foaled before the Show, or whose foal has died, she shall, if not in milk, be eligible without further entry to compete among the Yeld Mares. Agricultural Yeld Mares must produce a foal within 12 months from the first day of the Show. A Mare in a class for "Mares or Geldings" may or may not have had a foal in the year of the Show, but shall not have her foal exhibited with her, nor be in milk at the time of the Show.

Calves and Foals. 32. With reference to Regulation 30, birth of a live or full-time calf must be certified; and in regard to Regulation 31, birth of at least a nine months' foal; or in the case of the death of the dam, a Veterinary *Calving and Foaling Certificates.* Surgeon's certificate must be produced certifying that at the time of death the animal was so far advanced with calf or foal that if it had lived it would have produced a calf or foal, as required by Rules 30 and 31. Certificates of calving required by the foregoing Regulations must reach the office of the Secretary within ten months of the last day of the

Show; foaling certificates within thirteen months of the last day of the Show. In default of this, the animal will be regarded as having failed to fulfil the Regulations, and the prize will therefore pass to the animal next in order of merit or be forfeited.

Special Prizes.

33. Except when otherwise provided, the awards of Special Prizes shall not be subject to the Regulations as to calving and foaling.

Payment of Prizes.

34. The Premiums awarded, except those withheld till birth of calf or foal is certified, will be paid as soon after the Show as practicable, and, with the exception of the Tweeddale Gold Medal, Special Cups, and Medals, may be taken either in money or in plate.

Hunters.

35. In the classes for Hunters, Judges are empowered to transfer to the proper classes horses which, in regard to weight-carrying, are in their opinion entered in the wrong classes.

Soundness of Horses.

36. Judges are particularly requested to satisfy themselves, as far as possible, regarding the soundness of all Horses before awarding the Prizes, and to avoid giving Prizes to animals showing symptoms of hereditary diseases. The Judges may consult the Society's Veterinary Surgeon if they deem it expedient. No protests on veterinary grounds will be received.

Ewes.

37. All Ewes must have reared lambs in the year of the Show; and Ewes of the Blackfaced and Cheviot breeds must be in milk, and have their lambs at foot.

Clipping.

38. Sheep must have been clipt bare after 1st January of the year of the Show, and the Judges are instructed to examine the fleeces of the Sheep selected for Prizes, and to cast those on which they find any of the former fleece. This Rule does not apply to Cheviot sheep.

Sows.

39. Sows must have produced a litter of pigs in the year of the Show, prior to the opening day. Pigs must belong to the same litter, and be uncut.

Poultry.

40. In Poultry the Aged Birds must have been hatched previous to, and Cockerels and Pullets in, the year of the Show.

Railway Passes.

41. Railway Certificates for Stock and Implements are issued to Exhibitors before the Show along with their Tickets of Admission, one Certificate for the outward and another for the return journey being sufficient for each Exhibitor for any number of exhibits.

Admission of Stock.

42. Poultry and Stock will be admitted on Monday, the day before the opening of the Show, and, with the exception of Horses, must be in the Yard before 12 o'clock that night. Horses must be in before 8 o'clock on the morning of Tuesday, except those entered in classes for which other times for arrival are elsewhere stated in this List. Judging begins at 10 A.M. on Tuesday. Exhibited on Tuesday, Wednesday, Thursday, and Friday. Stock may be admitted on the Saturday preceding the Show, but only by sending two days' prior notice to the Secretary.

Parades.

43. Horses and Cattle must be paraded at the times stated in the Programme of the Show, and when required by the Stewards, and under their direction. In Parade, Horses must be ridden or led as provided in their respective classes. Prize and commended Cattle and Horses will receive two rosettes each, which must be attached to the head of the animal, one on each side. Attendants must be beside their animals *twenty minutes before the hour of Parade*, and be ready to proceed to the ring immediately on receiving the order of the Stewards. Infringement of this Rule, or failure of any attendant to obey the orders of the Society's officials, will render the Exhibitor liable to a fine of 20s. for each separate infringement or act of disobedience, and to the forfeiture of any or all of the Prizes awarded to him at this Show.

Responsibility of Exhibitors.

44. Exhibitors shall be answerable for all acts, whether committed by themselves, their servants, or others in charge of their Stock, and shall be responsible for the condition of their animals during the whole time they remain in the Showyard.

Moving from stalls. 45. No animal shall be taken out of its stall after 10 A.M. during the Show except by order of the Stewards, or with permission of the Secretary.

Washing Cattle. 46. Cattle shall not be taken out of their stalls to be washed after the Judging has been commenced. Cattle must not be washed beside the Judging Rings. Those infringing this Rule shall be liable to a fine of 10s.

Soaping prohibited. 47. Soap or other adhesive material must not be used in dressing cattle or horses. Infringement of this Rule will render the animal upon which the material is used liable to be disqualified.

Accommodation for Animals. 48. Loose-boxes will be provided for Stallions, three-, two-, and one-year-old entire Colts; for two- and one-year-old Fillies, and for Mares with foals at foot; closed-in stables for all the other Horses, and covered accommodation for the whole of the other Live Stock. In no case, either in the ordinary classes or "Extra Stock," will a box be provided except for the classes here specified. Stalls (floored) for attendants on Cattle, Horses, and Sheep will be provided at same rates as those charged for Stock. Exhibitors requiring the boxes, stalls, or pens for their animals to be floored must give instructions to the Showyard contractors, Messrs Macandrew & Co., Showyard, ten days before the Show opens. (For charges, see Rule 70.)

Floored stalls for Animals.

Securing Cattle. 49. Bulls must be secured by nose-rings, with chains or ropes attached, or with strong halters and double ropes. All Cattle, other than Highland Cattle, must be tied in their stalls.

Concealing Animals. 50. During the time the Show is open to the public no rug shall be hung up so as to conceal any animal in a horse-box or stall, except with the special permission of the Steward of that department.

Fodder. 51. Five days' supply of straw, hay, grass, and tares will be provided free by the Society. Any additional fodder or other kinds of food required will be supplied at fixed prices in the Forage-yard. Any servant removing bedding from an adjoining stall will be fined in double the amount taken. Exhibitors may fetch their own cake or corn to the Yard, but not grass, tares, hay, or straw. Coops, food, and attendance for Poultry will be provided by the Society.

Feeding appliances. 52. Servants in charge of Stock must bring their own buckets or pails, and a piece of rope or sheep-net to carry their forage. Mangers, sheep and pig troughs, will be provided.

Sawdust. 53. Sawdust must not be used as bedding for Stock.

Water. 54. As the command of water in the Yard is limited, it is particularly requested that waste be avoided.

Lights and Smoking. 55. No lights allowed in the Yard at night, and Smoking is strictly prohibited within the Sheds. Those infringing this Rule shall be liable to a fine of 10s.

Removal of stock. 56. Cattle, Sheep, Swine, or Poultry cannot be removed from the Yard till 5 P.M. on Friday, the last day of the Show, except on certificate by the Veterinary Surgeon employed by the Directors, countersigned by the Steward of the department or the Secretary.

Withdrawal of horses overnight. 57. At the close of the Show on Tuesday, Wednesday, and Thursday, horses may be withdrawn for the night on a deposit of £5 for each animal, which shall be forfeited, along with any prize money it may have gained, if the animal is not brought back. They must return between 7 and 7.30 the following morning, and those not in before 8 shall forfeit 10s. Horse passes to be applied for at the Secretary's Office between 5 and 6 P.M. on Tuesday, and the deposit, unless forfeited in whole or in part, will be returned between 12.30 and 2.30 on Friday.

Order in removal. 58. When the Stock is leaving the Yard, no animal is to be moved till ordered by those in charge of clearing the Yard. Those transgressing this Rule shall be liable to a fine of 10s., and to be detained till all the other Stock is removed.

Penning and removing Poultry.

59. Poultry may be penned before the opening and removed at the close of the Show by Exhibitors themselves or their representatives. In the event of neither the Exhibitor nor an authorised representative of the Exhibitor being present to pen or remove Poultry, the birds will be penned and removed by men hired and paid by the Society, but this will be done on the understanding that the men are hired to do the work on behalf of Exhibitors, and solely at their risk, and that the Society will be in no way responsible for expenses incurred or loss of or injury to Exhibits by errors or accidents in penning, despatching, or conveying Exhibits.

Closing of Poultry Shed.

60. On the opening day of the Show the Poultry Shed will be closed to the public during the Judging. On the last day of the Show the Poultry Shed will be closed to the public at 4 P.M.; at 5 P.M. Exhibitors or their representatives will be admitted to the Shed to remove Exhibits, provided the Exhibitor has, *not later than* 11 A.M. *on the last day of the Show*, given written notice to the Secretary to the effect that the Exhibitor or the Exhibitor's representative will attend at the Poultry Shed at 5 P.M. to remove the birds.

JUDGING STOCK AND POULTRY.

Opening Gates.

61. On Tuesday, the first day of the Show, no person will be admitted, except Servants in charge of Stock, till 8 A.M., when the Gates are opened to the public.

Judging.

62. The Judges will commence their inspection at 10 A.M. The spaces reserved for the Judging will be enclosed, and no encroachment shall be permitted.

Insufficient merit.

63. In no case shall a Premium be awarded unless the Judges deem the animals to have sufficient merit; and where only one or two lots are presented in a section, and the Judges consider them unworthy of the Premiums offered, it shall be in their power to award a lower prize.

Commendations.

64. In addition to the Premiums, the Judges are authorised to award three Commendations in each section, if the entries are numerous and the animals of sufficient merit. These Commendations consist of—Very Highly Commended, Highly Commended, and Commended.

Ayrshire Cows and Heifers.

65. Ayrshire Cows which have not calved before the Show, whether entered in the class for Cows in Milk or for Cows in Calf, shall be judged along with the Cows in Calf, and Ayrshire Cows or Heifers which have calved before the Show—in whichever of the two classes entered—shall be judged along with Cows in Milk.

Attending Members.

66. Attending Members will accompany each section of the Judges. It will be the duty of Attending Members to bring the animals out to the Judges and to see that no obstruction is offered to them, and that the space reserved for them is not encroached upon; to ticket the prize animals; to send the Nos. of prize animals to the Award Lectern at the side of the Members' Pavilion; to assist the Judges in completing their return of awards; and should any difficulty arise, to communicate with the Stewards or Secretary.

67. It shall not be competent for any Exhibitor, nor for his Factor or Land-Steward, to act as a Judge or attending Member in any class in which he is competing.

DAIRY PRODUCE.

68. Dairy Produce will be received in the Showyard on Monday, the day before the opening of the Show, and till 8 A.M. on Tuesday, the first day of the Show. Judged at 10 A.M. on Tuesday. Exhibited Tuesday, Wednesday, Thursday, and Friday.

69. Dairy Produce must have been made on the Exhibitor's farm in the year of the Show. No Exhibitor shall show more than one lot in each

class. No lot can be removed from the Yard till 5 P.M. on Friday, the last day of the Show. The Society undertakes no responsibility for the receipt or despatch of exhibits, nor for the loss of exhibits, nor for any injury they may sustain during the Show.

STALL RENT (INCLUDING ENTRY FEE).

70. The following rates (which include Entry Fees and Stall Rent) shall be paid by Exhibitors when making their Entries :—

	Members.		Non-Members.	
	s.	*d.*	*s.*	*d.*
Stalls for Cattle, each	15	0	25	0
Ayrshire Cows in milk and in calf, Classes 28, 29, and 30 (enclosed stalls) . . .	25	0	35	0
Boxes for Horses in Classes 33, 34, 35, 40, 50, 51, 52, 56, and 57	30	0	40	0
Boxes for Horses in Classes 36, 43, 44, 45, 46, 51, 55, 58, 59, 60, 61, 65, 67, 68, 70, 71, and 72 .	22	6	32	6
Stalls for Horses in Classes 37, 38, 39, 41, 42, 47, 48, 49, 53, 75, and 76	20	0	30	0
Stalls for Ponies in Classes 62, 63, 64, 66, 69, 73, and 74	15	0	20	0
Shed Accommodation for Machines for driving competitions, each	5	0	10	0
Sheep or Swine, per pen	10	0	15	0
Poultry, each entry	2	0	3	0
Dairy Produce, each entry . . .	4	0	6	0
Covered Booths for offices, 9 feet by 9 feet .	70	0	100	0
Newspaper offices . . £2, 10s.				

Floored Stalls.—Exhibitors desiring the boxes, stalls, or pens for their animals to be floored can have this done by, ten days before the opening of the Show, giving instructions to the contractors, Messrs Macandrew & Co., the Showyard, to whom the following charges for flooring have to be paid: Horses, 10s. each; Shetland Ponies, Cattle, Sheep, and Swine, 7s. each.

Entries in more than one Class.—In the case of animals entered in more than one class, the entry fee, whether for Post or other Entries, shall be five shillings for each class after the first. This does not apply to the Jumping Competitions.

EXTRA STALL FOR ATTENDANTS.

71. Exhibitors of Stock shall be entitled to take an extra Stall or Box for the accommodation of their attendants, but they must state when making their Entry that the Stall or Box is to be used for that purpose, and remit rent, which is at the same rate as stated above for the particular class of stock. They must also state next to which animal they wish the attendant's accommodation to be placed.

IMPLEMENTS AND OTHER ARTICLES.

Admission. 72. Implements will be received in the Yard from Tuesday, 10th July, till 5 o'clock on the afternoon of Monday, 16th July. Exhibited Tuesday, Wednesday, Thursday, and Friday. The Schedule of Entry must be filled up so far as within the knowledge of the Exhibitor, and prices must be stated.

Premiums. 73. No Money Prizes or Medals, except when specially offered, will be given by the Society for Implements of any kind.

Refusing Entries. 74. Agricultural Implements, and Implements and collections of articles not Agricultural, will be received for Exhibition, but the

Secretary is entitled to refuse Entries from dealers in articles not deemed worthy of Exhibition.

Local Operatives.

75. In order to encourage exhibits of Agricultural Implements from operative Blacksmiths and Carpenters in the district of the Show, open space will be provided for these in some less prominent part of the Yard at a charge of 10s. for space 10 feet wide and 20 feet deep.

Order of Implements.

76. Implements will be entered in the following sections—viz., 1st, Space without Shedding, 20 feet deep; 2nd, Shedding, 20 feet deep, 7 feet high to eave; 3rd, Shedding, 20 feet deep, 7 feet high to eave, boarded at back; 4th, Motion Yard, without Shedding, 50 feet deep; 5th, Motion Yard, 50 feet deep, with Shedding, 20 feet wide, 10 feet high to eave; 6th, Open space for Agricultural Implements from operative Blacksmiths and Carpenters in the district of the Show. Exhibitors must specify the space they require.

Articles not entered.

77. Every article to be exhibited must be entered on the Society's Entry Form. Any article not so entered that is taken to the Show is liable to be ordered out of, or removed from, the Showyard, or confiscated to the Society. Exhibitors infringing this rule are moreover liable to a fine of £1.

Selling by auction and noisy behaviour forbidden.

78. "Cheap-Jacks" are not admitted to the Showyard. The selling of goods by auction, shouting, and other behaviour calculated to annoy visitors or Exhibitors, are strictly forbidden. Exhibitors infringing this Regulation are liable to a fine of £1, and to have themselves and their goods ordered out of, or removed from, the Showyard, or to have their goods confiscated to the Society.

Placing Exhibits. Removing Exhibits.

79. The articles of each Exhibitor must be all placed in one stand, except Implements in motion, and must not on any account extend beyond the allotted space. No article shall be moved out of its stand, or the stand dismantled, till the termination of the Show, at 5 P.M. on Friday. Those infringing this Rule shall be liable to a fine of 10s.

Restoring Turf.

80. When the ground requires to be broken, the turf must be carefully lifted and laid aside, and the surface must be restored to the satisfaction of the Society, and at the expense of the Exhibitor. Failing this being done, the Society shall be at liberty to restore the ground and charge the cost to the Exhibitor.

Arranging Exhibits.

81. Exhibitors must arrange their own articles *within* the space allotted to them before 9 o'clock on Tuesday, and to the satisfaction of the Stewards in charge of the Implement Yard. Exhibitors are prohibited from subletting space allotted to them, and from displaying the name of any other firm on their Stand.

Handbills.

82. Exhibitors are not allowed to distribute handbills anywhere in the Yard except at their own Stand; and they must not for this or any other purpose encroach upon the adjacent alleys or open spaces.

Sweeping Stands, &c.

83. Exhibitors are required to have their Stands and the portions of the alleys immediately adjoining them swept up before eight o'clock on each morning of the Show.

Fuel.

84. All Machines requiring steam or fire must be entered as such in the Certificate, and will be placed in the Motion Yard. *Coke only shall be used in all cases where fire is required.* Coal shall not be used at any time in the Showyard. Those infringing this Rule shall incur a penalty of £5.

Steam Engines. Motors.

85. No Steam Engine shall be driven in the Yard at a greater speed than 4 miles an hour. Traction Engines shall not be used in conveying Exhibits or other goods into, from one place to another in, or out of the Showyard. Without *written* permission by the Steward of Implements or Secretary, Motor Waggons shall not be used in conveying goods into or out of the Showyard.

86. Locomotive and Traction Engines and other Machines must not be moved from their places without permission of the Secretary or Stewards, and must not leave their stands till 6 P.M. on Friday.

Consigning Implements.

87. There must be attached to each Implement, when forwarded to the Show, a label bearing the Exhibitor's name, and that of the Implement, as well as the number of the Exhibitor's stand.

88. The carriage of all Implements must be prepaid.

Photographing in Showyard.

89. Photographing in the Showyard is not permitted, except by photographers having a Stand in the Showyard or holding a "Photographer's Ticket." The "Photographer's Ticket" may be had from the Secretary, price 15s. It admits the holder to the Show when open to the public, and entitles him to photograph in the Showyard, subject to arrangements made by the Stewards.

Covered Booths.

90. Covered Booths for Offices (9 feet by 9 feet), purely for business, not for exhibition of goods, can be had for £3, 10s. to Members and £5 to Non-Members.

Exhibitors' and Attendants' Tickets.

91. Each Exhibitor in the Implement Department who is not a Member of the Society will receive one free Ticket of Admission to the Showyard for himself or a member of his firm, and will receive, in addition, for the use of attendants employed by him at his Stand, two Tickets of Admission for each complete ten feet of shedding in the Motion Yard, and one Ticket for each complete ten feet of shedding in the other sections. No additional Free Tickets can be issued in any circumstances whatever. Additional Attendants' Tickets, not more than five for any one Exhibitor, may be purchased at 5s. each.

Tickets to be filled up and signed.

92. The Tickets of Admission for Exhibitors and Attendants referred to in the foregoing Regulation will (about fourteen days prior to the Show) be issued to the Exhibitors in blank, with the number of the Exhibitor's Stand. The name of the person for whom each ticket is intended must be written on it before it is used. Each person holding a Free Ticket of Admission must sign his or her name on the back thereof, and must also, when required, sign his or her name in the book at the Entrance Gate.

Tickets not Transferable.

Exhibitors' attendants are strictly cautioned not to lend or transfer their Tickets, which can be used only by the persons whose names they bear, and who must be *bona fide* acting for, or employed by, the Exhibitor. No Ticket is transferable.

Improper use of Tickets.

An Exhibitor is liable to a fine of £1 for each case of transfer or other improper use of a Ticket issued to himself or employee.

Admission of Supplies for Stand-holders.

93. The following are the arrangements for the admission of Supplies (Refreshments or other goods) for Stand-holders during the Show: Messenger on foot (with or without hand-barrow) with supplies, admitted by Special Ticket; price for one admission, 1s., for the four days, 3s. Horse vehicle and driver with supplies, admitted by Special Ticket; price for one admission, 1s., for the four days, 5s. These Special Tickets may be had from the Secretary. Horse vehicles, with supplies, admitted throughout the day on the first day of the Show; on the other three days they will not be admitted between the hours of 10 A.M. and 5 P.M. except by written permit from the Secretary.

94. The Society reserves the right to allot to applicants for Stand either the whole or part of the space they ask for.

95. The Society will not be responsible for any accident that may occur from the machinery belonging to any Exhibitor; and it is a condition of entry that each Exhibitor shall hold the Society harmless, and indemnify it against any legal proceedings arising from any accident caused by his machinery.

STALL RENT.

96. Ground to be taken in spaces of 10 feet frontage by 20 feet deep, except in Motion Yard, which is to be 10 feet or any larger amount of frontage by 50 feet deep. Exhibitors must take their space wholly covered or wholly open. Space is not let partly covered and partly open.

97. Rates for space, payable by Exhibitors when making their Entries:—

	Members.	Non-Members.
Space without Shedding, 20 feet deep, per 10 feet .	£1 5 0	£1 15 0
Shedding, 20 feet deep, 7 feet high to eave, per 10 feet	1 5 0	1 15 0
Shedding, 20 feet deep, 7 feet high to eave, *boarded at back*, per 10 feet	1 12 0	2 2 0
Space in Motion Yard, without Shedding, 50 feet deep, per foot	0 5 0	0 8 0
And with Shedding, 20 feet deep, 10 feet high to eave, per foot	0 7 0	0 10 0
Covered Booths for offices, 9 feet by 9 feet, each .	3 10 0	5 0 0
Newspaper offices, each . . £2, 10s.		

ADMISSION OF THE PUBLIC.

The public will be admitted daily at 8 A.M. Judging begins on Tuesday at 10 A.M. The charges for admission to the Yard will be—Tuesday, from 8 A.M. till 5 P.M., 5s. Wednesday, from 8 A.M. till 5 P.M., 3s. Thursday, from 8 A.M. till 5 P.M., 2s. Friday, from 8 A.M. till 5 P.M., 1s.

ADMISSION OF MEMBERS AND EXHIBITORS.

On exhibiting their "*Member's Ticket*," which is strictly not transferable, Members of the Society are admitted free to the Showyard and to the Enclosures and Stands around the Large Ring, excepting the Reserved Seats in the Grand Stand, and such other parts as may be reserved for any special purpose. Tickets will be sent to all Members residing in the United Kingdom whose addresses are known, and on no account will duplicates be issued. **All Members not producing their tickets must pay at the gates, and the admission money will not on any account be returned.** Tickets must be signed by Members before being presented at the gate.

Tickets of admission to the Showyard are sent to Exhibitors of Stock, Poultry, and Dairy Produce (not Members) whose Entry Fees amount to not less than 10s.

For Exhibitors of Implements and their assistants tickets are issued as provided in the Regulations for Implements.

RESERVED SEATS IN GRAND STAND.

For Charges, apply to Secretary.

VARIOUS.

Placards, except those of the Society, are prohibited both inside the Showyard and on the outside of the Boundary Fence, with the exception of those belonging to Exhibitors, whose right is confined to their own stalls. No newspapers or any other article allowed to be carried about the Yard for sale or display. No strolling bands or musicians admitted.

No Carriages or Equestrians admitted without special leave from the Directors, and then only for Invalids. Bath-chairs may be brought in.

Premium Lists, Regulations, and Certificates of Entry may be obtained by applying at the Secretary's Office, No. 3 George IV. Bridge, Edinburgh.

All Communications should be addressed to JAMES MACDONALD, Esq., *Secretary of the Highland and Agricultural Society of Scotland, No.* 3 *George IV. Bridge, Edinburgh. From* 12*th to* 20*th July to the Secretary's Office, Showyard, Peebles.*

Address for Telegrams—"SOCIETY," EDINBURGH.

LAST DAYS OF ENTRY.

IMPLEMENTS AND OTHER ARTICLES—Monday, 14th May.

STOCK, POULTRY, AND DAIRY PRODUCE—Friday, 8th June.

No Entry at ordinary fees taken later than those which are received at the Society's Office, Edinburgh, by first post, or 10 o'clock, on Friday morning (8th June). Post Entries for Cattle, Horses, Sheep, and Swine taken on payment of 10s. additional for each entry (Poultry at double fees) till Wednesday morning (13th June), at the Society's Office, Edinburgh, at 10 o'clock.

RAILWAY ARRANGEMENTS.

The Railway Companies will be furnished with a list of the Exhibitors of Stock and Implements, after the 16th June. All applications for horse-boxes and trucks, and for information as to arrangements of Special Trains, must be made by the Exhibitors themselves to the Stationmaster where their stock is to be trucked.

The arrangements made by the Railway Companies for the conveyance of Live Stock and Goods to and from the Show are **indicated** *below, but exhibitors are recommended to apply to the respective companies for* **full particulars** :—

1. Live Stock and Goods *to* the Show to be charged ordinary rates.

2. Live Stock and Goods *from* the Show, *if sold*, to be charged ordinary rates.

3. Live Stock and Goods *from* the Show, *if unsold*, to be carried at half rates back to the station whence they were sent, at owners' risk, on surrender of a certificate from the Exhibitor to the effect that they are really unsold; failing surrender of such certificate, ordinary rates must be charged. The reduction to half rate is to be allowed only when the animals or goods are returned by the same route as that by which they were conveyed *to* the Show. The minimum charge for Stock returned at half rates will be one-half the ordinary minimum.

If the unsold Live Stock which was carried on the outward journey by Passenger Train in horse-boxes be required to be returned by Goods Train in cattle trucks, half the Goods Train rates must be charged.

If the unsold Live Stock which was carried on the outward journey by Goods Train in cattle trucks be required to be returned by Passenger Train in horse-boxes, half the Passenger Train rates must be charged.

4. Horses and Cattle, when sent for exhibition from one Agricultural Show to another, in another part of the country, are charged the ordinary single rates in respect of each journey, from point to point, up to the last station to which they are sent for exhibition. If remaining unsold when returned from the latest Show to the originating or home station, they are—on surrender of the necessary certificates—charged half rates, provided such return journey is made by the line of the company by whose route it was conveyed on the outward journey, and provided the railway traversed was covered on the outward journey. If conveyed by Goods Train, Unsold Live Stock transferred from one Agricultural Show to another in another part of the country must be charged ordinary rates.

5. Unsold goods, previously carried by railway, transferred from one Agricultural Show to another, in another part of the country, will be conveyed at half rates at owners' risk, on production of certificate from the Exhibitor to the effect that they are unsold; failing production of such certificate, ordinary rates will be charged. This applies only to Goods Trains.

6. Poultry to be charged ordinary rates both ways, and will not be accepted for conveyance unless the carriage charges are prepaid.

7. Horse-boxes, or other Passenger Train vehicle, will not be provided for the carriage of Live Stock sent by Goods Train and invoiced at Goods Train rates. *For rates for Horse-boxes by Passenger and Special Trains, apply to the Railway Companies.*

8. Provender conveyed to Agricultural Shows with Live Stock will be charged ordinary rates, except so much of the same as may be required on the journey.

9. Men, certified by the owners to be *bona fide* in charge of Live Stock, to be

conveyed free in the same train as the animals, as follows: One man for each consignment, except where the consignment requires more than one vehicle, when one man for each vehicle may be sent free; but no pass is given unless the charge for the consignment amounts to as much as the charge for one horse. When two or three horses forming one consignment are sent in the same horse-box, and a man is required to travel with each animal, the men may be conveyed free, provided each horse is charged at the single horse rate. Upon both the outward and homeward journeys a separate certificate and contract must be given, which must be retained by the stationmaster at the outward or homeward starting-point, as the case may be.

10. The ordinary rates charged for carriage do not in any case include delivery *to*, or collection *from*, the Show ground.

11. Agricultural Societies' Show Plant must be charged at Class C rates, station to station.

12. Tents, Canvas, and other articles carried to Shows, not for exhibition, to be charged the ordinary rates both going and returning.

13. The carriage of all Live Stock, Implements, and other articles going to the Show for exhibition must be *prepaid.*

DELIVERY CHARGES.

The following will be the Charges for the Delivery or Collection of Live Stock, Implements, and other articles between the Railway Stations at Peebles and the Show ground:—

1. General traffic, 2s. 6d. per ton (minimum charge, 1s. 6d.)
2. Implements and Machinery (Agricultural), not exceeding 1 ton each, 2s. 6d. per ton (minimum charge, 2s.)
3. Implements and Machinery (Agricultural), on their own wheels (specially hauled), not exceeding 1 ton, 2s. 6d. each.
4. Single articles, exceeding 1 ton but not exceeding 3 tons, 3s. per ton.
5. Single articles, exceeding 3 tons but not exceeding 5 tons, 6s. per ton.
6. Single articles, exceeding 5 tons, by special arrangement only, but no less charge than 8s. per ton.
7. Rustic Houses, by special arrangement only, but no less charge than 7s. 6d. each load.
8. Carriages, four-wheeled, 2s. 6d. each.
9. Carriages, two-wheeled, 2s. each.
10. Cattle, in floats, 2s. 6d. per head, minimum charge, 4s.
11. Sheep and Pigs, in floats, 1s. per head (minimum charge, 3s., and maximum charge, 5s. for each float).

THE PRESIDENT'S CHAMPION MEDALS

A Champion Medal is given by SIR WALTER THORBURN, President of the Society, for the *best Animal or pen* in each of the following sections:—

1. Shorthorn.
2. Aberdeen-Angus.
3. Galloway.
4. Highland.
5. Ayrshire.
6. Clydesdale Stallions.
7. Draught Geldings.
8. Clydesdale Mares and Fillies.
9. Hunters.
10. Hackneys.
11. Ponies.
12. Polo and Riding Ponies.
13. Cobs.
14. Highland Ponies.
15. Shetland Ponies.
16. Harness Horses.
17. Blackfaced Sheep.
18. Cheviot.
19. Border Leicester.
20. Half-bred.
21. Shropshire.
22. Oxford Down.
23. Suffolk.
24. Swine.

NOTE.—*Animals entered as Extra Stock may compete for these Medals. Former Winners of the President's Medals are eligible. The Society shall have the right to photograph the Winners for publication in the 'Transactions.' At this Show no animal can be awarded more than one of these Medals.*

CATTLE

SHORTHORN.

Class		Premiums. 1st. £	2nd. £	3rd. £	4th. £	
1.	Bull calved before 1904 . .	15	10	5	3	
2.	Bull calved in 1904 . . .	15	10	5	3	
3.	Bull calved in 1905 . . .	12	8	4	2	
	[1] Best Shorthorn Bull in the Show, entered or eligible for entry in Coates's Herd-Book—£25.					
	Breeder of best Bull of any age in the three Classes—The Silver Medal.					
4.	[2]Cow of any age in Milk . .	12	8	4	2	
5.	Heifer calved in 1904. . .	10	5	3	2	
6.	Heifer calved in 1905. . .	10	5	3	2	
	[1] Best Shorthorn Female in the Show, entered or eligible for entry in Coates's Herd-Book—£25.					
	President's Medal for best Shorthorn.					£158

ABERDEEN-ANGUS.

[3] Two Silver Cups, each of the value of £50, for the best Bull of any age and for the best Cow of any age (Heifers excluded) in the Aberdeen-Angus cattle classes. These are to be Challenge Cups, and are to be known as the "Ballindalloch Challenge Cups." They are offered under the following conditions: 1. The Directors shall assume charge of the Cups, and shall frame such rules for their safety as they may decide upon. 2. Each Cup shall be held by the winner for one year as a Challenge Cup, and shall become the property of the exhibitor who shall win it five times, not necessarily in succession. 3. The Society shall, at their own expense, cause to be engraved on each Cup each year, the year, the place of the Show, name of successful exhibitor, name and herd-book number of the animal, and name of its breeder. 4. The Society shall award to the breeder of the successful animals a Silver Medal, bearing that he is the breeder of the winner of the "Ballindalloch Challenge Cup." 5. In every other respect the Cups shall be won according to regulations which the Directors may from time to time enact.

Class		1st. £	2nd. £	3rd. £	4th. £	
7.	Bull calved before 1st Dec. 1903 .	15	10	5	3	
8.	Bull calved on or after 1st Dec. 1903.	15	10	5	3	
9.	Bull calved on or after 1st Dec. 1904.	12	8	4	2	
	[3] Champion Cup, value £50, for the best Bull in the three Classes.					
	Breeder of best Bull of any age in the three Classes—The Silver Medal.					
	Breeder of the Winner of the Ballindalloch Challenge Cup—The Silver Medal.					92
	Carry forward					£250

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[1] Given by the Shorthorn Society.

[2] Cows in this Class must have produced a calf within nine months prior to the Show (Rule 29).

[3] The Cup for Bulls given by Sir George Macpherson Grant, Bart., and that for Cows by the late Mr C. Macpherson Grant of Drumduan.

Brought forward £250

Class	ABERDEEN-ANGUS—*continued.*	Premiums. 1st. £	2nd. £	3rd. £	4th. £	
10.	[1]Cow of any age in Milk	12	8	4	2	
	[2] Champion Cup, value £50, for the best Cow of any age in the above Class.					
	Breeder of the Winner of the Ballindalloch Challenge Cup—The Silver Medal.					
11.	Heifer calved on or after 1st Dec. 1903	10	5	3	2	
12.	Heifer calved on or after 1st Dec. 1904	10	5	3	2	
	[3]Champion Gold Medal for best breeding animal of the breed in the Showyard.					
	President's Medal for best Aberdeen-Angus Animal.					66
	GALLOWAY.					
13.	Bull calved before 1st Dec. 1903	15	10	5	3	
14.	Bull calved on or after 1st Dec. 1903	15	10	5	3	
15.	Bull calved on or after 1st Dec. 1904	12	8	4	2	
	Breeder of best Bull of any age in the three Classes—The Silver Medal.					
16.	[1]Cow of any age in Milk	12	8	4	2	
17.	Heifer calved on or after 1st Dec. 1903	10	5	3	2	
18.	Heifer calved on or after 1st Dec. 1904	10	5	3	2	
	President's Medal for best Galloway.					158
	HIGHLAND.					
19.	Bull calved before 1904	15	10	5	3	
20.	Bull calved in 1904	15	10	5	3	
21.	Bull calved in 1905	12	8	4	2	
	Breeder of best Bull of any age in the three Classes—The Silver Medal.					
22.	[1]Cow of any age in Milk	12	8	4	2	
23.	Heifer calved in 1903	10	5	3	2	
24.	Heifer calved in 1904	10	5	3	2	
	President's Medal for best Highland Animal.					158
	AYRSHIRE.					
25.	Bull calved before 1904	12	8	4	—	
26.	Bull calved in 1904	10	7	3	—	
27.	Bull calved in 1905	8	5	3	—	
	Breeder of best Bull of any age in the three Classes—The Silver Medal.					60

Carry forward £692

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[1] Cows in these Classes must have produced a calf within nine months prior to the Show (Rule 29).

[2] The Cup for Bulls given by Sir George Macpherson Grant, Bart., and that for Cows by the late Mr C. Macpherson Grant of Drumduan.

[3] Given by the Polled Cattle Society.

Brought forward £692

Class	AYRSHIRE—*continued.*	Premiums. 1st. £	2nd. £	3rd. £	
28.	[1]Cow calved before 1903 in Milk .	12	8	4	
29.	[1]Cow in Milk, calved after 1st Jan. 1903	10	7	3	
30.	[1]Cow of any age in Calf, or Heifer calved in 1903 in Calf and due to calve within nine months after the Show	10	7	3	
31.	Heifer calved in 1904 . . .	10	5	3	
32.	Heifer calved in 1905 . . .	8	5	3	
	President's Medal for best Ayrshire.				98
					£790

HORSES

FOR AGRICULTURAL PURPOSES.

Class	DRAUGHT STALLIONS.	Premiums. 1st. £	2nd. £	3rd. £	4th. £	
33.	Stallion foaled before 1903 . .	20	15	10	4	
34.	Entire Colt foaled in 1903 . .	20	15	10	4	
35.	Entire Colt foaled in 1904 . .	20	12	8	4	
36.	Entire Colt foaled in 1905 . .	15	10	6	4	
	Breeder of best Male Animal of any age in the four Classes—The Silver Medal.					£177
	President's Medal for best Clydesdale Stallion or Colt.					
	DRAUGHT GELDINGS.					
37.	Draught Gelding foaled before 1903	10	5	3	—	
38.	Draught Gelding foaled in 1903 .	6	4	3	—	
39.	Draught Gelding foaled in 1904 .	6	4	3	—	
						44
	President's Medal for best Draught Gelding.					
	DRAUGHT MARES AND FILLIES.					
40.	Mare of any age, with Foal at foot	20	12	7	4	
41.	Yeld Mare foaled before 1903 .	12	9	6	4	
42.	Yeld Mare or Filly foaled in 1903 .	12	9	6	4	
43.	Filly foaled in 1904 . .	12	9	6	4	
44.	Filly foaled in 1905 . .	12	9	6	4	
						167

Carry forward £388

No animal is allowed to compete in more than one Class, except that horses entered in other Classes may also compete in the Jumping and Driving Classes.

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[1] Cows in these Classes must have produced a calf within nine months prior to the Show (Rule 29).

Brought forward £388

Best Clydesdale Mare or Filly—Cawdor Challenge Cup, value 50 guineas. See Conditions below.

CONDITIONS OF COMPETITION FOR THE CAWDOR CHALLENGE CUP. (VALUE 50 GUINEAS.)

1. This Cup is offered by the Clydesdale Horse Society of Great Britain and Ireland for the best Clydesdale Mare or Filly registered in the Clydesdale Stud-Book, entered in any of the Draught Horse classes, at the Show at which it may be competed for.

2. The Council of the Clydesdale Horse Society shall, at a meeting held not later than the month of August in any year, decide at what Show or Shows the "Cawdor Challenge Cups" shall be competed for in the year immediately following.

3. The Cup must be won three times by an Exhibitor with different animals (but not necessarily in consecutive years) before it becomes his absolute property; and immediately after an award has been made, and official notification thereof has been received by the Secretary of the Clydesdale Horse Society from the Secretary of the Society under whose auspices the Competition has taken place, the name of the winner, and of the animal with which the Cup has been won, will be engraven on the Cup.

4. The winner of the Cawdor Challenge Cup, other than the absolute winner, shall, before delivery thereof is made to him, give security to the Clydesdale Horse Society that he shall surrender the same to the Society and deliver it at the Society's office when called upon to do so.

5. Until the Cup be won outright, the winner on each occasion will receive the Clydesdale Horse Society's Silver Medal as a memento of his winning the Cup; and the said Medal shall bear an inscription specifying the Show at which, the date on which, and the name of the animal with which the Challenge Cup has been won, as well as the name of the owner.

In name of the Council of the Clydesdale Horse Society,

ARCHD. MACNEILAGE, *Secretary.*

[1] Breeder of Best Clydesdale Brood Mare—The Robert Murdoch Prize, value £10.

President's Medal for best Clydesdale Mare or Filly.

HUNTERS.

Class

45. Colt, Gelding, or Filly, foaled in 1905, the produce of thorough-bred Stallions, out of Mares of any breed,—Five Prizes [2]—£10, £7, £5, £2, £1.

Carry forward £388

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[1] Bequest by the late Miss Murdoch.

[2] Given by Sir John Gilmour of Montrave, Bart.

Brought forward £388

Class	HUNTERS—*continued.*	Premiums. 1st. £	2nd. £	3rd. £	
46.	Filly, Mare, or Gelding, for field, foaled in 1904—*in hand* .	8	5	3	
47.	Yeld Mare, Filly, or Gelding, for field, foaled in 1903—*in hand* .	8	5	3	
	[1] Best Hunter Filly in the foregoing Classes, registered or entered in the Hunter Stud-Book — Gold Medal, value £10, 10s.				
48.	Made Hunters, any age, able to carry up to 13 stone . .	15	10	5	
49.	Made Hunters, any age, able to carry over 13 stone . .	15	10	5	
50.	[2]Hunter Brood Mare, with foal at foot—£15, £8, £4.				
					92

President's Medal for best Hunter.

HACKNEYS.

(All to be shown in hand.)

Class		1st. £	2nd. £	3rd. £	
51.	Brood Mare, 15 hands and upwards, with Foal at foot, or to foal this season to a registered Sire .	10	6	4	
52.	Brood Mare, under 15 hands, with Foal at foot, or to foal this season to a registered Sire . .	10	6	4	
53.	Yeld Mare or Filly, foaled in 1903 .	8	5	3	
54.	Filly, foaled in 1904 . .	8	5	3	
55.	Filly, foaled in 1905 . .	8	5	3	
56.	Stallion, foaled in or before 1903, over 15 hands . . .	10	6	4	
57.	Stallion, foaled in or before 1903, over 14 and not over 15 hands .	10	6	4	
58.	Entire Colt, foaled in 1904. .	8	5	3	
59.	Entire Colt, foaled in 1905 . .	8	5	3	
					160

All animals entered in the above Hackney Classes must be registered in the Hackney Stud-Book except in Classes 55 and 59, and animals entered in Classes 55 and 59 must be eligible for entry in the Hackney Stud-Book.

Carry forward £640

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[1] Given by the Hunter Improvement Society.

[2] Given by Captain Clayhills Henderson of Invergowrie, R.N.

Brought forward £640

HACKNEYS—*continued.*

Class		Premiums. 1st. £	2nd. £	3rd. £	
	[1] A Champion Prize of £10, or a Gold Medal of the same value, at the option of the Exhibitor, is offered by Hackney Horse Society for best Mare or Filly in Hackney or Pony Classes.				
	President's Medal for best Hackney.				

PONIES.

(*Classes* 60 *to* 64 *will be judged by Hackney Judges.*)

Class		1st. £	2nd. £	3rd. £	
60.	Stallion, 3 years old and upwards, over 12, not exceeding 14 hands —*in hand* . . .	5	3	2	
61.	Stallion, 3 years old and upwards, 12 hands and under—*in hand* .	5	3	2	
62.	Yeld Mare, Filly, or Gelding, 3 years old and upwards, over 13 and not over 14 hands — *in saddle*	5	3	2	
63.	Yeld Mare, Filly, or Gelding, 3 years old and upwards, over 12 and not over 13 hands — *in saddle*	5	3	2	
64.	Yeld Mare, Filly, or Gelding, 3 years old and upwards, 12 hands and under—*in hand* . .	5	3	2	
	President's Medal for best Pony.				50

POLO AND RIDING PONIES.

Class		1st. £	2nd. £	3rd. £	
65.	Stallion, 3 years old and upwards, 13.2 and not exceeding 14.2 hands, entered in the Polo and Riding Pony Stud-Book, or got by a Registered Polo Pony sire or out of a Registered Polo Pony dam	5	3	2	
	President's Medal for best Polo or Riding Pony.				10

Carry forward £700

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[1] A Mare 6 years old or more must have had a living foal. Winners of the Hackney Society's £10 Prize or Gold Medal in 1906, except at the London and Royal English Shows, excluded. The winner must be entered or accepted for entry in Hackney Stud-Book, and certified free from hereditary disease. This Gold Medal is not redeemable.

Class		Premiums. 1st. £	2nd. £	3rd. £	4th. £	
	Brought forward					£700
	COBS.					
66.	Riding Cob or Pony, not eligible by pedigree or type for any of the other Pony Classes, from 13.2 to 15 hands	5	3	2	—	
	President's Medal for best Pony in Class 66.					10
	[1] HIGHLAND PONIES.					
67.	Highland Pony Stallion, 3 years old or upwards, not exceeding 14.2 hands, entered or accepted for entry in the Highland Section of the Polo Pony Stud-Book .	10	3	2	—	
68.	Highland Pony Entire Colts foaled in 1904 or 1905 . . .	10	3	2	—	
69.	Highland Pony Mare, 3 years old or upwards, not exceeding 14.2 hands, yeld or with foal at foot, entered or accepted for entry in the Highland Section of the Polo Pony Stud-Book . . .	10	3	2	—	
	President's Medal for best Highland Pony.					[2] 45
	SHETLAND PONIES. (*All to be shown in hand.*)					
70.	Stallion, not exceeding 10½ hands, foaled before 1903 . .	5	4	3	2	
71.	Entire Colt, not exceeding 10½ hands, foaled in 1903 or 1904 . .	5	4	3	2	
72.	Mare, not exceeding 10½ hands, with foal at foot . . .	5	4	3	2	
73.	Yeld Mare, not exceeding 10½ hands	5	4	3	2	
74.	Filly, not exceeding 10½ hands, foaled in 1903 or 1904 .	5	4	3	2	
	President's Medal for best Shetland Pony.					70
	Carry forward					£825

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[1] Exhibitors desirous of entering in these Classes Ponies not yet accepted for entry in the Highland Section of the Polo Pony Stud-Book are recommended to communicate with Mr J. H. Munro Mackenzie of Calgary, Isle of Mull, who will advise as to the steps to be taken with a view to the registration of the Ponies. All entries for above Classes must be accompanied by a certificate, either from Mr Mackenzie or from Mr A. B. Charlton, Secretary to The Polo and Riding Pony Society, 12 Hanover Square, London, W., to the effect that the animals are entered or accepted for entry in the Highland Pony Section of the Polo Pony Stud-Book.

[2] The Polo and Riding Pony Society give £15 towards these prizes.

Brought forward £825

DRIVING COMPETITIONS.	Premiums. 1st.	2nd.	3rd.	
Class	£	£	£	
75. Yeld Mare, Filly, or Gelding, any age, in Harness, 15 hands and upwards, to be driven in the ring . .	10	5	3	
76. Yeld Mare, Filly, or Gelding, any age, in Harness, under 15 hands, to be driven in the ring . .	10	5	3	
Special Prize for best Pony in Class 76 under 13 hands . .	5	—	—	
[1] *President's Medal for best animal in the*				41
				£866

JUMPING COMPETITIONS

SPECIAL REGULATIONS.

(*See also the Regulations on pages* 57 *to* 64.)

1. Jumping Competitions will take place on the afternoons of Wednesday, Thursday, and Friday, the 18th, 19th, and 20th July.
2. *Entries* for each day's Competitions will close at the Secretary's Office in the Showyard at 6 P.M. on the preceding day.
3. *Entry Fees.*—Wednesday, £1; Thursday and Friday, 10s. for each class.
4. *Accommodation* for jumping horses will be provided as follows: Covered shed in which to stand during the day free of charge; or, on application to the Secretary not less than ten days before the opening of the Show, stalls or loose-boxes will be provided at a charge (in addition to the Entry Fee) of £1 for a stall, and £1, 10s. for a loose-box, which must be paid along with the Entry Fee at the time of application.
5. Horses entered for jumping only need not enter the Showyard till 12 noon on the day of Competition, and may leave the Showyard at 6 P.M. each day.
6. *The Jumps* may consist of Single Hurdle, Gate, Double Hurdle, Wall, and Water Jump, power being reserved by the Society to alter these, as well as the Handicaps, as may be thought desirable.

WEDNESDAY.	1st.	2nd.	3rd.	4th.	5th.
Class	£	£	£	£	£
1. Horse or Pony any height . . .	20	15	10	5	3
THURSDAY.					
2. Horse or Pony any height, Handicap, hurdles and gate being raised 8 inches for the winner of the first prize, and 4 inches for the winner of the second prize in Class 1	10	8	5	3	2
Carry forward	30	23	15	8	5

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[1] *An animal that has won a President's Medal in another section in this Show shall not be eligible to compete for the Medal in this section.*

FRIDAY.

Class	1st.	2nd.	3rd.	4th.	5th.	
	£	£	£	£	£	
Brought forward	30	23	15	8	5	
3. Horse or Pony any height, Handicap, hurdles and gate being raised 8 inches for the winner of the first prize, and 4 inches for the winner of the second prize in either of Classes 1 or 2—4 inches extra for the winner of the two first prizes in Classes 1 and 2 . .	10	8	5	3	2	
Champion Prize for most points in Prizes with one or more horses in above Classes —First Prize to count five points; Second Prize, four points; Third Prize, three points; Fourth Prize, two points; and Fifth Prize, one point—the money to be evenly divided in the event of a tie .	10	—	—	—	—	
						£119

SHEEP

BLACKFACE.

Class	Premiums. 1st.	2nd.	3rd.	4th.	
	£	£	£	£	
77. Tup above one shear . .	12	8	4	2	
78. Shearling Tup . . .	12	8	4	2	
79. Ewe above one shear, with her Lamb at foot . . .	10	5	2	—	
80. Shearling Ewe or Gimmer . .	10	5	2	—	
[1] Champion Prize, value £10, for best Blackface Tup in the foregoing Classes.					£86

[2] The Sinclair Scott Challenge Trophy, value 100 guineas, for a Group of Sheep consisting of one aged ram, one shearling ram, one ewe and lamb, the lamb to be the produce of the ewe exhibited, and may be either a tup or ewe lamb, and to be judged as part of the group, and one gimmer, all to be bred by and the property of the exhibitor, or bred on the farm now in his possession and the property of exhibitor, and shown in the ordinary classes; the Trophy to become the property of the exhibitor winning it three times with different sheep; lambs, shearling rams, and gimmers being eligible to compete again. The Society will give a Silver Medal, duly inscribed, commemorative of the event, to the winner on each occasion.

President's Medal for best pen of Blackface Sheep.

Carry forward £86

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[1] Given by Mr C. Howatson of Glenbuck.

[2] Given by the late Mr R. Sinclair Scott of Burnside.

Brought forward £86

CHEVIOT.[1]

Class		Premiums. 1st. £	2nd. £	3rd. £	4th. £
81.	Tup above one shear	12	8	4	2
82.	Shearling Tup	12	8	4	2
83.	Ewe above one shear, with her Lamb at foot	10	5	2	—
84.	Shearling Ewe or Gimmer	10	5	2	—

[2] Challenge Cup, value £25, for best Sheep in the Cheviot Classes, to become the property of the Exhibitor who wins it three times.

86

President's Medal for best pen of Cheviot Sheep.

BORDER LEICESTER.

Class		1st. £	2nd. £	3rd. £	4th. £
85.	Tup above one shear	12	8	4	2
86.	Shearling Tup	12	8	4	2
87.	Ewe above one shear	10	5	2	—
88.	Shearling Ewe or Gimmer	10	5	2	—

Tweeddale Gold Medal for best Border Leicester Tup.

[3] Prize of £10 for best pen of Border Leicester Sheep, drawn from the Ordinary Classes, registered or eligible for registration in the Border Leicester Flock-Book.

86

President's Medal for best pen of Border Leicesters.

HALF-BRED.

Class		1st. £	2nd. £	3rd. £	4th. £
89.	Tup above one shear	12	8	4	2
90.	Shearling Tup	12	8	4	2
91.	Ewe above one shear	10	5	2	—
92.	Shearling Ewe or Gimmer	10	5	2	—
93.	[4] Three Ewe Lambs	10	5	3	2

[5] Champion Prize, value £10, for the best pen of Half-Bred Sheep in the foregoing Classes.

106

President's Medal for best pen of Half-Breds.

Carry forward £364

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[1] Mr M. G. Thorburn contributes £40 to the prizes for Cheviot Sheep.
[2] Given by the Cheviot Sheep Society.
[3] Given by the Society of Border Leicester Sheep-Breeders.
[4] Mr E. Douglas Paton contributes £10 towards these prizes.
[5] Given by the Peebles Co-Operative Society.

Class		1st.	2nd.	3rd.	
	Brought forward				£364
		Premiums.			
	SHROPSHIRE.	1st.	2nd.	3rd.	
Class		£	£	£	
94.	Tup above one shear	6	4	2	
95.	Shearling Tup	6	4	2	
96.	Ewe above one shear	5	3	2	
97.	Shearling Ewe or Gimmer	5	3	2	
	President's Medal for best pen of Shropshires.				44
	OXFORD-DOWNS.				
98.	Shearling Tup	6	4	2	
99.	Shearling Ewe or Gimmer	5	3	2	
	President's Medal for best pen of Oxford-Downs.				22
	SUFFOLK.				
100.	Shearling Tup	6	4	2	
101.	Shearling Ewe or Gimmer	5	3	2	
	[1] Best Suffolk Ewe in Class 101 bred in Scotland—£3, £2.				
102.	[1] Three Ewe Lambs, uncoloured and untrimmed, except as to the squaring of the tail—£5, £3, and £2.				
	[1] Best Pen of Suffolk Ewe Lambs in Class 102 bred in Scotland—£3, £2.				22
	President's Medal for best pen of Suffolk Sheep.				
	FAT SHEEP.				
103.	Three Fat Lambs, any breed or cross, dropped in the year of the Show	5	3	—	
					8
					£460

[2] Best pens of Lambs in Class 103 out of Blackface Ewes, and got by Border Leicester Tup—£5, £3, and £2.

[3] Best pens of Cross-bred Lambs in Class 103 got by a Pure-bred Shropshire Tup—£7 and £3.

[4] Best pen of Lambs in Class 103 got by a Suffolk Tup, and out of Cheviot or Blackface Ewes—£5.

[4] Best pen of Lambs in Class 103 got by a Suffolk Tup, and out of Border Leicester, Half-bred, or Three-parts-bred Ewes—£5.

[1] Given by the Suffolk Sheep Society.
[2] Given by Mr M. G. Thorburn.
[3] Given by the Shropshire Sheep-Breeders' Association.
[4] Given by the Suffolk Sheep Society.

SWINE

Class	LARGE WHITE BREED.	Premiums. 1st. £	2nd. £	3rd. £	
104.	Boar	6	4	2	
105.	Sow	6	4	2	
106.	Pair of Boars, not above 8 months old	5	3	2	
107.	Pair of Gelts, not above 8 months old	5	3	2	
					£44
	BERKSHIRE.				
108.	Boar	6	4	2	
109.	Sow	6	4	2	
110.	Pair of Boars, not above 8 months old	5	3	2	
111.	Pair of Gelts, not above 8 months old	5	3	2	
	President's Medal for best pen of Swine.				44
					£88

EXTRA STOCK

Animals not included in the Classes for Competition may be exhibited as Extra Stock, and may receive Awards as follows:—Very Highly Commended, or Highly Commended, carrying the Medium Silver Medal, or Commended, for which the Bronze Medal is given.

Animals entered as Extra Stock are eligible to compete for the President's Medals, whether former winners of these Medals or not.

POULTRY

First Premium—ONE SOVEREIGN; *Second Premium*—TEN SHILLINGS. In each Class in which there are six or more entries, a Third Prize of Five Shillings may be awarded, provided there is sufficient merit in the pens. Three or more Commendations may also be given—thus, Very Highly Commended, Highly Commended, and Commended.

Champion Medals are offered as follows:—

1. Best Cock, any Variety.
2. Best Hen, any Variety.
3. Best Cockerel, any Variety.
4. Best Pullet, any Variety.
5. Best Pen of Ducks.
6. Best Pen of Geese.
7. Best Pen of Turkeys.

Aged Birds must have been hatched previous to, and Cockerels and Pullets in, the year of the Show.

	Class	
DORKING—		
Coloured	1.	Cock
	2.	Hen
	3.	Cockerel
	4.	Pullet
Silver Grey	5.	Cock
	6.	Hen
	7.	Cockerel
	8.	Pullet
COCHIN-CHINA	9.	Cock
	10.	Hen
BRAHMAPOOTRA	11.	Cock
	12.	Hen
BRAHMA OF COCHIN	13.	Cockerel
	14.	Pullet
SCOTCH GREY	15.	Cock
	16.	Hen
	17.	Cockerel
	18.	Pullet
HAMBURG—		
Black	19.	Cock
	20.	Hen
Any other Variety	21.	Cock
	22.	Hen
Any Variety	23.	Cockerel
	24.	Pullet
PLYMOUTH ROCK	25.	Cock
	26.	Hen
	27.	Cockerel
	28.	Pullet
MINORCA	29.	Cock
	30.	Hen
	31.	Cockerel
	32.	Pullet
LEGHORN—		
White	33.	Cock
	34.	Hen
Any other Variety	35.	Cock
	36.	Hen
Any Variety	37.	Cockerel
	38.	Pullet
LANGSHAN	39.	Cock
	40.	Hen
LANGSHAN	41.	Cockerel
	42.	Pullet
ORPINGTON—		
Black	43.	Cock
	44.	Hen
Buff	45.	Cock
	46.	Hen
Any Variety	47.	Cockerel
	48.	Pullet
WYANDOTTE—		
Gold	49.	Cock
	50.	Hen
Silver	51.	Cock
	52.	Hen
Any Variety	53.	Cockerel
	54.	Pullet
INDIAN GAME	55.	Cock
	56.	Hen
	57.	Cockerel
	58.	Pullet
GAME—		
Old English	59.	Cock
	60.	Hen
Modern	61.	Cock
	62.	Hen
Any Variety, not including Indian	63.	Cockerel
	64.	Pullet
BANTAM—		
Game, any Variety, including Old English	65.	Cock
	66.	Hen
Any other Variety Bantam	67.	Cock
	68.	Hen
ANY OTHER RECOGNISED BREED OF POULTRY	69.	Cock
	70.	Hen
	71.	Cockerel
	72.	Pullet
TABLE FOWLS—		
Any Breed or Cross, to be judged solely as Table Fowls, and without regard to fancy points	73.	Pair of Cockerels
	74.	Pair of Pullets
DUCKS—		
Aylesbury	75.	Drake
	76.	Duck
	77.	Drake (Young)
	78.	Duck (Young)
DUCKS—		
Rouen	79.	Drake
	80.	Duck
Any other Variety	81.	Drake
	82.	Duck
Any Breed (Aylesbury excepted)	83.	Drake (Young)
	84.	Duck (Young)
GEESE	85.	Gander
	86.	Goose
TURKEYS	87.	Cock
	88.	Hen

Amount of Poultry Premiums, £154.

DAIRY PRODUCE

No Exhibitor to show more than one lot in any Class.

Class		Premiums.			
		1st.	2nd.	3rd.	
		£	£	£	
1.	Powdered Butter, not less than 7 lb.	4	2	1	
2.	Fresh Butter, three 1-lb. rolls	4	2	1	£14
3.	Cheddar Cheese, 56 lb. and upwards—£6, £4, £2, £1				13
4.	Flat White Cheese, made according to any method, from a dairy where all the cheese are made flat, 40 lb. and upwards—£4, £2, £1				7
5.	Cheese, 14 lb. and under—£3, £2, £1				6
					£40

[ABSTRACT

ABSTRACT OF PREMIUMS.

(24 Champion Medals given by SIR WALTER THORBURN.)

GIVEN BY THE SOCIETY.

1.	Cattle	£790	0	0
2.	Horses	866	0	0
3.	Jumping	119	0	0
4.	Sheep	460	0	0
5.	Swine	88	0	0
6.	Poultry	154	0	0
7.	Dairy Produce	40	0	0
8.	Medals to Breeders, &c.	20	0	0
9.	Prizes for Timber[1]	20	0	0
		£2557	0	0
	Private Subscriptions	65	0	0
	Given by the Society	£2492	0	0

CONTRIBUTED PRIZES.

1.	The Shorthorn Society	£50	0	0			
*2.	Sir George Macpherson Grant, Bart.	50	0	0			
*3.	The late Mr C. Macpherson Grant of Drumduan	50	0	0			
4.	Polled Cattle Society	10	0	0			
*5.	Cawdor Challenge Cup	52	10	0			
6.	Bequest by late Miss Murdoch	10	0	0			
7.	Sir John Gilmour, Bart.	25	0	0			
8.	Hunters' Improvement Society	10	10	0			
9.	Captain Clayhills Henderson	27	0	0			
10.	Hackney Horse Society	10	0	0			
11.	Polo and Riding Pony Society	15	0	0			
12.	Mr Charles Howatson	10	0	0			
*13.	The late Mr R. Sinclair Scott	105	0	0			
14.	Society of Border Leicester Sheep-Breeders	10	0	0			
15.	Mr M. G. Thorburn	50	0	0			
16.	Mr E. Douglas Paton	10	0	0			
*17.	Cheviot Sheep Society	25	0	0			
18.	Peebles Co-operative Society	10	0	0			
19.	Suffolk Sheep Society	30	0	0			
20.	Shropshire Sheep-Breeders' Association	10	0	0			
					570	0	0
					£3062	0	0

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[1] Grant to Royal Scottish Arboricultural Society for Prizes for Timber.
* Challenge Prizes.

JAMES MACDONALD, *Secretary*.

3 GEORGE IV. BRIDGE,
EDINBURGH, *February* 1906.

The Society's Show for 1907 will be held at Edinburgh.

MEMBERS ADMITTED SINCE THE LIST WAS PUBLISHED IN FEBRUARY 1905.

ARRANGED ACCORDING TO SHOW DISTRICTS.

ELECTED 7TH JUNE 1905, AND 10TH JANUARY 1906

1.—GLASGOW DISTRICT.

ARGYLL.

Admitted
1905 Armour, Robt. L., Machrihanish, Campbeltown
1905 Bruce, Peter, Ach-na-cloich, Connell, Argyll
1905 Buchanan, Donald, Ballochendrain, Glendaruel, S.O.
1905 Bullough, Tom, of Fasnacloich, R.S.O.
1905 Campbell-Wyndham, R. P. Bouverie, of Dunoon, Glengarr House, Dunoon
1905 Colvill, John, Rockbank, Campbeltown
1906 Cordiner, Matthew, Balliemore, Lochgilphead
1905 Dick, Matthew, Bank of Scotland, Campbeltown
1905 Dobie, John, Clydesdale Bank, Dunoon
1905 Edgar, James, Ri-Cruin, Lochgilphead
1905 Elliot, Thomas, Ardtornish, Morven, R.S.O.
1905 Ellison, Francis Beaumont, Bragleenbeg, Kilninver, Oban
1905 Fleming, John, Camquhart, Glendaruel, S.O.
1905 Gillies, Lachlan, Ardachaple, Colintraive
1905 Hall, Stuart, Killean House, Tayinloan
1905 Ironside, William, Columba Terrace, Oban
1905 Leschallas, Captain John H. P., Glenfinart, Ardentinny, Greenock
1906 Lothian, John, of Treshnish, Isle of Mull, Oban
1905 M'Alister, John, Ardyne, Toward
1905 MacArthur, Alaster, National Bank, Inveraray
1905 M'Arthur, Neil, Balgreggan, Campbeltown
1905 M'Calman, Hugh, Monydrain, Lochgilphead
1905 Macdonald, A., Auchnashellach, Lochgilphead
1905 M'Intyre, Alex., Kilbridemore, Glendaruel, S.O.
1905 M'Lachlan, Hugh, Stroneskar, Lochgilphead
1905 M'Laren, Malcolm, Hotel, Dalmally
1905 M'Nicol, William, Garvie, Glendaruel, S.O.
1905 M'Vean, John, Invernahyle, Appin
1905 Maxwell, Robert, Baraskomil, Campbeltown
1905 Mitchell, Hugh, Seafield, Campbeltown
1905 Montgomery, James, M.R.C.V.S., Ardrishaig
1905 Murray-Allan, R. A., yr. of Glenfeochan, Kilmore, Oban
1906 Ross, Alex., General Merchant, Kilmartin
1905 Stalker, P., Achadunan, Inveraray
1906 Sutherland, John N., Oakbank, Auchnacraig, Mull
1905 Weir, Archd., Auchengarron, Glendaruel, S.O.
1905 Weir, James, Baligreggan, Campbeltown
1906 Weir, James, Gallowhill, Campbeltown
1905 Weir, Norman, Tigh-an-truish Hotel, Ardencaple, Kilninver, Oban

AYR.

1905 Angus, R. L., Lugar House, Lugar, Ayrshire
1906 Bruce, William, Langholm, Dundonald
1906 Caldwell, John, Springhill, Kilmarnock
1906 Clark, Alex., Auchenlongford, Sorn
1905 Clark, William Donald, Currah, Girvan
1906 Coldwell, James, Cockhill, Dundonald
1905 Dobbie, John, Alloway Street, Ayr
1906 Dunlop, James, Oldhall, Fenwick
1906 Goldie, David, Little Shewalton, Irvine
1905 Hunter, R. H., Knocklandside, Kilmaurs
1905 M'Cubbin, Wm. D., Lochlands, Maybole
1906 M'Intyre, Edward, Park View Stud Farm, Giffen, Beith
1906 M'Intyre, James, Park View Stud Farm, Giffen, Beith
1905 M'Kay, Thomas, Springbank, Monkton, Ayr
1906 Mackinnon, Thos. Neil, of Lanfine, New Milns
1906 Mitchell, William, Grougar Mains, Kilmarnock
1906 Nisbet, James, Implement Maker, Dundonald
1905 Pollock, Andrew, Engineer, Mauchline
1906 Scott, C. G., of Halkshill, Largs

1906 Scott, David, Dumfries House, Cumnock
1905 Scott, Robt., Boghead, Girvan
1906 Shaw, Jas. Edward, County Clerk, Ayr
1906 Smith, William, Brownlee, Dundonald
1906 Spiers, John, Dyke, Symington
1905 Steel, John, Alton Albany, Barr
1906 Taylor, William, Fortacres, Dundonald
1905 Woodburn, Robt., Whitehill, Hurlford

BUTE.

1905 Crawford, Peter, Torrylinn, Kilmorie, Arran
1906 Inglis, Wm., Forester, Cladoch, Brodick
1906 Montgomery, Alexr., Auchinteerie, Rothesay
1906 Stuart, Henry Campbell, Rhubodach, Kyles of Bute

LANARK.[1]

1906 Aitkenhead, George, Lochinch, Govan
1905 Allison, Thomas, Carnwath Mill Farm, Carnwath
1905 Baird, Douglas, Torrance Hotel, East Kilbride
1905 Baird, William, Gallowhill, Carmunnock
1905 Ballantyne, James, Straven House, Carluke
1905 Barr, John Bent, of Blackwood, Kirkmuirhill
1905 Barrie, James, of Mossplatt, Carstairs
1905 Boreland, John, Tile Manufacturer, Stonehouse
1906 Brown, Harold G., of Cormiston, Biggar
1905 Buchanan, James, 65-67 Elcho Street, Graham Square, Glasgow
1905 Calderwood, Andrew, Righead, East Kilbride
1905 Caldwell, James C., Hollylea, Craighead Road, Govan
1906 Campbell, David Russell, 25 Woodside Quadrant, Glasgow
1905 Carruthers, Andrew, Nethertown, Auchenheath, Hamilton
1906 Chapman, William A., Meadowhead, Airdrie
1905 Clark, W. S., Thornhill, Wishaw
1905 Connell, Matthew, Agricultural Implement Maker, Carmunnock
1905 Connell, Matthew, jun., Agricultural Implement Maker, Carmunnock
1905 Craig, A. Blackburn, 97 Maxwell Drive W., Bellahouston, Glasgow
1905 Cromb, John Burns, Clerk of Works, The Palace, Hamilton
1906 Cross, P. A. Munro, 14 Woodlands Terrace, Glasgow
1905 Cumming, James, Grain Merchant, Lanark
1905 Dick, John, Carnbroe Mains, Bellshill
1905 Dickie, Wm., sen., Victoria Works, East Kilbride
1905 Dickson, Andrew, Castlehill, Carmunnock
1905 Dickson, John B., Auchren, Lesmahagow
1905 Dobie, Robert, Garrion Haugh, Wishaw
1905 Donald, George, Braehead, Strathaven
1905 Durie, John, Blackwood Estate Office, Lesmahagow
1905 Dyer, Matthew, Sandyholm, Crossford, Carluke
1905 Dykes, Thomas, Priestgill, Strathaven
1905 Fleming, Jas., Meadowflat, Thankerton
1905 Fleming, William, Fisheston, Rutherglen
1905 Fleming, William, Corbichall, Lanark
1905 Fleming, William, Bogton, Torrance
1905 Forrest, James, Woodhall, Bishopbriggs
1906 Forrest, James F., Woodhall, Bishopbriggs
1906 Forrest, Mat. Henry, Woodhall, Bishopbriggs
1905 Garraway, Andrew B., Law Muir, East Kilbride
1906 Galloway, A. W., Molassine Co., Ltd., 125 Hope Street, Glasgow
1905 Giffen, Andrew, Baltic Chambers, 8 Cadogan Street, Glasgow
1905 Giffen, W R., Baltic Chambers, 8 Cadogan Street, Glasgow
1905 Gillies, Alex., North Brackenridge, Lesmahagow
1905 Goulding, Joseph, Dalpatrick, Carluke
1906 Greenshields, James John, of Kerse, Lesmahagow
1906 Hamilton of Dalzell, Lord, Dalzell, Motherwell
1905 Hamilton, James, Shawton, Chapelton, Hamilton
1905 Hamilton, John, Deadwaters, Kirkmuirhill
1905 Hamilton, Matthew G., Woolfords, Cobbinshaw
1906 Hamilton, Wm., Drumclog, Strathaven
1905 Hamilton, William, Moat Mains, Lesmahagow
1905 Hastie, John, Eddlewood, Hamilton
1905 Hastie, Peter, Stonefield, Blantyre
1905 Henderson, Joseph, Meikle Dripps, Thorntonhall
1906 Henderson, Robert Holmes, Cornsilloch, Netherburn, Hamilton
1905 Hunter, Alex. N., 89 Mitchell Street, Glasgow
1905 Kerr, Matthew, Estate Office, Hamilton
1905 Knox, John, North Hill of Dripps, Thorntonhall
1906 Kufeke, Hans F., c/o Nutrimol Feed Co., 67 Hope Street, Glasgow
1906 Logan, John, 197 Dumbarton Road, Glasgow
1905 M'Arthur, John, 202 Hunter Street, Glasgow.
1905 MacAulay, John, Rogerton, East Kilbride
1906 MacColl, Duncan, 80 Paisley Road West, Glasgow
1905 M'Feat, John, 81 Maxwell Drive, Glasgow
1905 M'Lean, Arch., Midtown of Blackwood, Lesmahagow
1906 M'Sorley, P., 44 Jamaica Street, Glasgow
1906 Marshall, Richard, Whitecraighead, Cleland, Motherwell
1906 Martin, James, Burnside, Strathaven
1906 Martin, William, West Dykes, Strathaven
1905 Meikle, Peter, Tarune, Glassford, Strathaven
1905 Mitchell, James, Muirhouse, Kirkmuirhill
1905 Mitchell, Thomas, Nethanfoot, Crossford, Carluke
1905 Montgomery, John, Dalserf Estate Office, Netherburn
1905 Morton, James, East Dykes, Strathaven
1905 Murdoch, Jas., Haughhead, Uddingston
1905 Murray, Joshua, Parkhall, Douglas
1905 Pate, Thomas, Muirsland, Lesmahagow
1905 Pearson, Douglas, Rock Villa Oil Mills, Port Dundas
1905 Pettigrew, James, jun., Bogside, Newmains
1906 Ramsay, Robert, Walstonfoot Farm, Newmains
1905 Reid, Dr John, Greenhill Cottage, Forth, Lanark

1905 Renwick, Andrew, Buchley Farm, Bishopbriggs
1905 Retson, John, Langside, Lanark
1905 Ritchie, Alex., 8 Croy Place, Glasgow
1905 Robb, Andrew, sen., F.R.C.V.S., 6 Canning Place, Glasgow
1905 Robb, William, F.R.C.V.S., 6 Canning Place, Glasgow
1905 Scott, William, Greenhills, East Kilbride
1905 Scouller, John, 117 Drury Street, Glasgow
1906 Shanks, Gavin, Shawhead Farm, Whifflet
1905 Shaw, John, Nerston, East Kilbride
1905 Shaw, William, Nerston, East Kilbride
1905 Shearer, Arch., Highflat, East Kilbride
1905 Simpson, Kerr A., B.L., of The Hill, Lesmahagow
1905 Stobo, Alex., Bonanhill, Strathaven
1905 Struthers, James H., Auston, Dunsyre, Carstairs Junction
1905 Taylor, John, M.R.C.V.S., Cathkin, Rutherglen
1905 Templeton, William, of Torland, Netherburn
1905 Todd, Mrs George, 13 Park Circus, Glasgow
1905 Todd, George, 13 Park Circus, Glasgow
1905 Torrance, Alex., Crookedstone, Quarter
1905 Weir, Charles, Implement Works, Strathaven
1905 Williamson, William, Belziehill, Bellshill
1905 Wilson, William, Udston, Stonehouse
1905 Young, Alex., Waterbank, Carmunnock
1905 Young, James, Greenfield, Strathaven
1905 Yuill, Andrew, Netherside, Strathaven
1905 Yuill, Thomas, Greathill, Strathaven

RENFREW.

1905 Aitkenhead, Alexander, Carnwadrick, Thornliebank
1905 Aitkenhead, Alex., Cowglen, Pollokshaws
1906 Aitkenhead, James, Hagbows, Pollokshields
1905 Alexander, William, Dripps Mill Farm, Busby
1905 Allan, David, Inches Farm, Eaglesham
1906 Buchanan, George, Hunterhill Farm, Paisley
1906 Carnduff, Andrew, Cross Arthurlie, Barrhead
1905 Clark, David, High Craigs, Eaglesham
1905 Clark, James, High Craigs, Eaglesham
1905 Clark, Robt., Hazelden, Newton Mearns
1905 Craig, Matthew, Eastwood Mains, Giffnock
1905 Cunningham, Robert, Agricultural Implement Maker, Pollokshaws
1906 Curr, James, Merrylea Farm, Cathcart
1905 Fleming, John, Windhill, Eaglesham
1905 Gardner, James, Hillington, Paisley
1905 Gardner, Jas., jun., Hillington, Paisley
1906 Gardner, Thomas, Wraes Mill, Barrhead
1905 Gemmell, Alexander, Humbie, Newton Mearns
1906 Gibb, James, Nether Southbar, Renfrew
1905 Gilmour, James, Overlee, Clarkston, Busby
1905 Graham, Patrick, Kittochside Farm, Busby
1905 Harvie, Robert, Darnley Mill, Nitshill
1905 Holms, John, Glenshinnoch, Bishopton
1905 Holms, John A., Formaken, Erskine
1906 Holms, Peter, Priestside, Kilmalcolm
1905 Holms, William, jun., Gladstone, Kilbarchan
1906 Houston, Gavin, Greenhill, Elderslie
1905 Jackson, Alexander, Greenlaw, Newton Mearns
1905 Knox, John, Malletsheugh, Newton Mearns
1906 Lambie, Alex., Balgray Mains, Newton Mearns
1906 Lambie, George W., Pilmuir Farm, Newton Mearns
1905 Lambie, John, jun., Langton, Newton Mearns
1905 Lambie, John, Patterton, Thornliebank
1905 M'Allister, James, Craig Road, Cathcart
1905 M'Coll, Hugh, Waterfoot, Busby
1905 M'Coll, Neil, Craigends Home Farm, Johnstone
1905 M'Crone, John, The Wood, Thornliebank
1905 M'Gee, Walter, Bridge Street Grain Mills,
1906 MacIndoe, Robert, Barshagra, Barrhead
1906 M'Lachlan, John, Drums, Greenock
1905 M'Neilage, Arden, Thornliebank
1905 Michie, David K., Elderslie Estates Office, Renfrew
1905 Millar, James, Flander, Newton Mearns
1905 Munro, Robert, Polnoon, Eaglesham
1905 Murdoch, Robt., West Hallside, Newton Mearns
1905 Park, William, Glenshinnoch, Bishopton
1905 Peddie, Robert, Castle Mains, Cathcart
1906 Raeside, Andrew, Floak Farm, Newton Mearns
1905 Raeside, Hugh, Langrigg, Newton Mearns
1905 Reid, John, Castle Farm, Newton Mearns
1905 Renfrew, Andrew, Barrance, Newton Mearns
1905 Renfrew, William, jun., Burnhouse, Newton Mearns
1905 Rennie, Alex., Wellmeadow, Paisley
1905 Rodger, David, Bonnyton, Eaglesham
1905 Rodger, James, Netherplace, Newton Mearns
1906 Shaw, John C., Gertrude Place, Barrhead
1905 Steven, Robert, Priesthill Farm, Nitshill
1905 Steven, Thos., Priesthill Farm, Nitshill
1905 Stirling, James, Housecraigs, Busby
1905 Strang, Geo., Upper Darnley, Barrhead
1905 Strang, Wm., Upper Darnley, Barrhead
1905 Watt, William, Letham, Newton Mearns
1906 Weir, James, Braidbar, Cathcart
1905 Wilson, Alex., Low Borland, Eaglesham
1905 Wilson, Andrew B., Middleton, Newton Mearns
1905 Young, David, Rysland, Newton Mearns
1905 Young, William, Haugh Farm, Nitshill

2.—PERTH DISTRICT.

FIFE.

1905 Anderson, J. L., Town Clerk, Cupar-Fife
1906 Butters, James, Masterton, Dunfermline
1905 Craig, William, Couston, Aberdour, Fife
1906 Danskin, John, V.S., Landale Street, Lochgelly
1906 Farmer, Geo. Fair, Shawsmill, Cardenden
1905 Kirk, Thomas, Estate Office, Mount Melville, St Andrews
1905 Marshall, Harley, of Dunduff, Dunfermline
1905 Mitchell, H. Q., Newbigging, Burntisland

1905 Morgan, John, Kilgour, Falkland, Fife
1906 Morris, Andrew Ireland, Grassmiston, Crail
1906 Nicol, J. M. R., Greenside, Largo
1905 Rothes, Earl of, Leslie House, Leslie
1906 Stewart, James, Headwell, Dunfermline
1905 Torrie, Thomas Jameson, Denork, St Andrews
1905 Waddell, James, Stenton, St Monance
1906 Wilson, Robert, Spittal Farm, Cardenden

FORFAR.

(Perth Show Division.)

1905 Carnegie, William, Coul, Forfar
1906 Langlands, James H., 31 Murraygate, Dundee
1906 Ogilvy, Herbert K., Baldovan House, Strathmartine
1905 Reid, James C., Kilmundie, Glamis
1905 Simpson, James, Newmill, Dunnichen, Forfar
1905 White, John A., Royal Bank, Forfar

KINROSS.

1905 Muirhead, Thos., Bankhead, Fossoway
1906 Rycroft, Col. Wm. Henry, Ard Gairney Kinross
1905 Smith, James, Banker, Kinross

PERTH.

(Perth Show Division.)

1906 Allan, John, Dalerno, Almondbank, Perth
1905 Cochrane, Andrew, Alyth (85 Tobago Street, Glasgow)
1906 Cunningham, James, Hillend, Perth
1906 Fraser, Adam, Balgarvie, Scone, Perth
1905 Irving, John Bell, Balmacneil, Ballinluig
1905 Lindsay, D. C. Rutherford, Ashintully, Kirkmichael, Blairgowrie
1905 Morison, Wm., Newmiln, Perth
1905 Smith, Robert, Burnside Farm, Stanley
1906 Thow, John, Rossie Farm, Dunning
1905 Yool, Thomas, Menzies Estate Office, Aberfeldy

3.—STIRLING DISTRICT.

CLACKMANNAN.

1905 Bleloch, James, Estate Office, Dollarbeg, Dollar
1906 Lawson, Robert, Grocer, Alloa
1906 Paterson, Hugh, Butcher, High Street, Alloa

DUMBARTON.

1906 Baird, Montagu William, Keppoch, Cardross
1906 Cameron, Charles Alex., Torloisque, Drumchapel, Glasgow
1905 Fleming, Hugh, Auchendennan Home Farm, Arden
1906 Stewart, W., Milton, Duntocher

PERTH.

(Stirling Show Division.)

1906 Brebner, Robert Fred., Estate Office, Gartmore
1906 Cairns, James, Coulshill, Auchterarder
1906 Cameron, Allan, Keilator, Crianlarich

STIRLING.

1905 Brown, John, 51 Murray Place, Stirling
1906 M'Farlane, George, 11 Princes Street, Stirling
1905 Paterson, John, Wester Frew, Kippen Station
1906 Thomson, John James, Myrehead, Linlithgow
1905 Veitch, Jas., High Craigton, Milngavie

4.—EDINBURGH DISTRICT.

EDINBURGH.

1906 Aitken, John, M.R.C.V.S., Causewayside, Edinburgh
1906 Allison, James, Carlowrie, Cramond Bridge
1905 Boyd, Thomas, 86 Salamander Street, Leith
1906 Byres, William, Baadsmill, West Calder
1906 Cadell, George, 20 Murrayfield Drive
1906 Fyfe, William, 4 Wolseley Place
1905 Graham, Robert, Dalhousie Mains, Dalkeith
1906 Hamilton, William H., of Cairns, Kirknewton
1905 Jack, J. Douglas, North Gyle, Corstorphine
1906 Keegan, Chas. B., Spittal, Penicuik
1905 Lawson, Alex. R., Galawater Estate, Fountainhall
1905 Millar, J. W., Leyden Park, Bonnyrigg
1905 Munro, Alex. J., 48 Castle Street
1906 Plenderleith, William, Rosewell Mains, Rosewell
1905 Porter, John, B.Sc., 18 George Square
1905 Runciman, Alex., Hatton Mains, Kirknewton
1905 Semple, Andrew, Rosebank, Midcalder
1906 Simpson, J. Rhys, Cousland, Dalkeith
1906 Stark, Robert, Nether Williamston, Midcalder
1906 Stewart, Geo., Contentibus, Midcalder
1905 Tillie, David, Brothershiels, Heriot
1905 Wyllie, James, The Craigs, Midcalder

HADDINGTON.

1905 Hadden, Thomas, Chesterhall, Longniddry
1905 Stoddart, Hugh, Wintonhill, Pencaitland

LINLITHGOW.

1906 Arkley, Robert, Kingsfield, Linlithgow
1906 Beaumont, John, Mannelhaugh, Linlithgow

1906 Brock, Sydney, Overton, Kirkliston
1906 Galbraith, Alex., Upper Kinneil, Linlithgow
1906 Hamilton, John, Springfield, Linlithgow
1906 Howat, James, Burghmuir, Linlithgow
1906 Johnstone, Jas., Windyknowe, Bathgate
1906 Milne, James, Home Farm, Dundas, South Queensferry
1906 Smith, Robert, Westfield, Winchburgh

5.—ABERDEEN DISTRICT.

ABERDEEN.

1906 Argo, James, Crannabog, Rothienorman
1906 Cruickshank, John W., Logienewton, Rothienorman
1906 Davidson, William, Burnside House, Turriff
1906 Duncan, Robt., Salesman, King Street, Aberdeen
1905 Hendry, George, County Buildings, Aberdeen
1905 Irvine, A. F., of Drum, Drumoak
1905 Leslie, R. W. H. Crawford, of Rothienorman
1906 Lobban, Wm., Loanhead, Drumblade, Huntly
1906 Miller, J. P., Sandilands Chemical Works, Aberdeen
1906 Preddy, Charles Arthur, Threpland, Drumlithie, Aberdeen
1906 Scott, John, Bruntstane, Huntly
1906 Simpson, Alex., Broadland, Cairnie, Huntly
1906 Smith, George, of Pittodrie, Pitcaple

BANFF.

1906 Gray, Alex., Grain Merchant, Buckie
1905 Mackay, George, Mains of Tannachy, Port Gordon
1905 Milne, Lewis, Mains of Findochty, Buckie

FORFAR.

(Aberdeen Show Division.)

1906 Francis, George Airth, West Seaton, Arbroath
1906 Ireland, David, Easter Balmirmir, Arbroath
1905 Milne, J. A., of Chapelton of Menmuir, Inchbrae, Brechin
1906 Salmond, Charles S., Legaston, Arbroath
1906 Smith, Alex., Findowie, Brechin
1906 Tindal, Robert P. S., East Mains of Rossie, Montrose

KINCARDINE.

1906 Anderson, David, Loirston, Nigg
1906 Falconer, Wm. G., Cairnton, Fordoun
1905 Milne, Robert, Inch of Arnhall, Edzell

6.—DUMFRIES DISTRICT.

DUMFRIES.

1906 Armstrong, Walter John, Park, Annan
1906 Cameron, James, Lincluden Mains, Dumfries
1906 Chalmer, John, Charlesfield, Annan
1906 Dunlop, George, Spaleton, Annan
1906 Erskine-Scott, Henry, Dunnabie, Ecclefechan
1905 Jackson, Stanley, c/o J. Borland, Auchencairn, Thornhill
1905 Lindsay, James, Brieryhill, Lockerbie
1905 Mackenzie, Thos., Mansfield, Thornhill
1905 Paterson, James S., Quhytewoollen, Lockerbie

KIRKCUDBRIGHT.

1906 Maxwell, James Todd, Screel, Castle-Douglas

WIGTOWN.

1906 Anderson, James, Inchparks, Stranraer
1905 Marshall, Albert James, Bridgebank, Stranraer

7.—INVERNESS DISTRICT.

ELGIN.

1906 Russell, Jas., 110 High Street, Elgin
1906 Stuart, Robert Dick, Rothes

INVERNESS.

1906 Hutchison, Alex., Balloan, Inverness
1905 Johnston, Hugh G., Culduthel Mains, Inverness
1906 Jones, Wm. Everard, Fassfern, Kinlochiel
1906 MacArthur, Donald Chas., Etteridge, Newtonmore, Kingussie
1906 MacGillivray, Donald H., Biallid, Newtonmore, Kingussie
1905 Mackintosh, Angus, Uig, Isle of Skye

NAIRN.

1906 Brodie, Capt. Alex., of Lethen, Nairn (2nd Scots Guards, Guards' Club, London)
1906 MacArthur, David, Fleenas, Nairn
1906 Squair, John, 4 Queen's Gate, Inverness
1906 Stephen, Wm., Meikle Geddes, Nairn

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1906 Cameron, James D., Kirkton, Golspie
1905 Finlayson, Peter, West Greenland, Castletown, Thurso
1905 Mackay, Donald, Town and County Bank, Thurso

8.—BORDER DISTRICT.

BERWICK.

1906 Lumsden, E. F., Mungoswalls, Duns
1906 Mather, Arthur, East Mains, Milne Graden, Coldstream
1905 Mather, J. C., Ellenford, Duns
1906 Mather, Matthew, Printonan, Duns
1906 Mather, William, West Mains, Milne Graden, Coldstream
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1906 Porteous, Andrew M., Solicitor, Coldstream

PEEBLES.

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1905 Ballantyne, Henry Norman, Caerlee, Innerleithen
1905 Buchan, William, Town Clerk, Peebles
1905 Cairns, Andrew, Live Stock Salesman, Peebles
1905 Douglas, George, Earlypier, Eddleston
1905 Elibank, Master of, M.P., Juniper Bank, Walkerburn
1906 Gairns, Alex. C., Cloverhill, Biggar
1905 Johnston, John C., V.S., Peebles
1905 Laidlaw, David, Hallsmyre, West Linton
1905 Masterton, Ebenezer B., Broughton Green, Broughton
1906 Montgomery, Richard, Home Farm, Lamancha
1905 Ritchie, Wm. C., Lyne Farm, Stobo
1906 Tudhope, B., Milkieston, Eddleston, Peebles
1906 Tudhope, Jas., Nether Falls, Eddleston
1906 Watson, Robert, South Park, Peebles

ROXBURGH.

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1905 Campbell, P. P., Estate Office, Mertoun, St Boswells
1906 Davidson, Alex., jun., Whitton, Kelso
1906 Greig, Major J. L., of Eccles, Kelso

SELKIRK.

1906 Elliot, Walter, Newhall, Clovenfords
1906 Roberts, Alex. F., of Fairnalee, Thornfield, Selkirk
1906 Steel, Samuel Strang, Philiphaugh, Selkirk

ENGLAND.

1905 Cooper, Sir R. P., Bart., Shonstone Court, Lichfield
1905 Marsden, H. R., Soho Foundry, Leeds
1906 Reed, T. Curwen, Hyde Farm, Stroud, Gloucestershire
1905 Rickerby, Joseph, 37 Botchergate, Carlisle
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1906 Sutton, Martin John, Seed Merchant, Reading
1905 Young, James Arthur, 161 Victoria St., Westminster, London

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1906 Raffan, James, Land Steward, Fota, Co. Cork

Number of Members in List published in February 1905 . .	6387
Number of Members admitted in June 1905	268
Number of Members admitted in January 1906 . . .	169
	6824
Deduct estimated deaths, &c.	184
Total . . .	6640

INDEX

A New Nitrogenous Manure: Lime Nitrogen or Calcium Cyanamide, by James Hendrick, B.Sc., 75.
Aberdeen Show, Proceedings in regard to, 435, 441.
Aberdeenshire Horned Cattle, by James R. Barclay, 193.
Abortion in Cows, Proceedings in regard to, 427, 429.
Accounts—see Finance.
Agricultural Co-operation in Orkney, 425—Grant in aid of, 428.
Agricultural Education, Proceedings in regard to, 424, 425, 426, 432, 437—Syllabus of Examination for Diploma, Appendix, 12.
Agricultural Statistics, 329.
Analyses for Members during 1905, by James Hendrick, 77.
Argyll Naval Fund, Proceedings in regard to, 440.
Ayrshire, Farming Methods in, by Archd. MacNeilage, 1.

Barclay, James R.: Aberdeenshire Horned Cattle, 193.
Barley, Price of, for 1905, 343—Over-dressing of, 428, 432.
Beans, Price of, for 1905, 347.
Bear, Wm. E.: Crop Yields at Home and Abroad, 23.
Botanical Department: Reports to General Meetings, 438, 442; Appendix, 39.
Buchan, Dr Alex.: Meteorology of 1905, 319.
Burnt Ale, Proceedings in regard to, 435.

Cameron, Donald, of Lochiel, Resolution on his death, 433.
Cattle, Aberdeenshire Horned, by James Barclay, 193.
Cereal and other Grain Crops of Scotland for 1905, and Meteorology of the Year relative thereto, 297.
Changes in Farm Implements since 1890, by John Speir, 46.
Chemical Department, Appendix, 32.
Chemist to the Society, Appointment of Mr Hendrick, 424.
Circuit of Shows, Proceedings in regard to, 427.
Committees for 1905-1906, Appendix, 7.
Cottages and Gardens: Premiums awarded in 1905, 414—Premiums offered in 1906, Appendix, 54.
Cows, Abortion in, Proceedings in regard to, 427, 429.
Crop Yields at Home and Abroad, by Wm. E. Bear, 23.
Crops of Scotland for 1905, and Meteorology of the Year relative thereto, 297.
Crowther, Charles: Milk Investigations at Garforth, 1905, 110.

Dairies, Cow-Sheds, and Milk-Shops Regulations, Proceedings in regard to, 430.
Dairy Department, Appendix, 27.
Dairy Investigations in the North-East of England, by Douglas A. Gilchrist and C. Bryner Jones, 63.
Dick Veterinary College, Proceedings in regard to, 429.
Directors for 1905-1906, Appendix, 5.
District Competitions, Premiums awarded in 1905, 414—Report to General Meeting, 442—Premiums offered in 1906, Appendix, 44.
Drysdale, John: Timothy Meadows, 17.

Edinburgh Corn-Market Grain Tables, 342.
Edinburgh Show, 1907, Proceedings in regard to, 429, 432, 433, 436, 441.
Education, Proceedings in regard to, 424, 425, 426, 432, 437, 442.
England, North-East of, Dairy Investigations in the, by Douglas A. Gilchrist and C. Bryner Jones, 63.
Entomological Department, Appendix, 40.
Essays and Reports, Premiums offered in 1906, Appendix, 42.
Examinations, Dates of, Appendix, 11.

Famous Galloways, by Very Rev. John Gillespie, LL.D., 166.
Farm Implements, Changes in, since 1890, by John Speir, 46.
Farming Methods in Ayrshire, by Archd. MacNeilage, 1.
Farquhar, James, death of, 129.
Fertilisers and Feeding Stuffs Act, Proceedings in regard to, 430.
Finance: Accounts for 1904-1905, 415—Abstract of the Accounts of the Glasgow Show, 1905, 418 — Abstract of the Accounts of the Argyll Naval Fund, 420—Report to General Meeting, 440.
Forestry Chair, Grant to Lecturer, 435.
Forestry Department: Proceedings in regard to, 426, 428—Report to General Meeting, 442 — Syllabus, Appendix, 20.

Galloways, Famous, by Very Rev. John Gillespie, LL.D., 166.
Garforth, Milk Investigations at, 1905, by Charles Crowther, 110.
Gas-Producers, Trials of Suction, 208.
Gibb, R. Shirra: Top-Dressing Pastures, Slag, Kainit, and Lime, 80.
Gilchrist, Douglas A., and C. Bryner Jones: Dairy Investigations in the North-East of England, 63.
Gillespie, Very Rev. John, LL.D.: Famous Galloways, 166.
Glasgow Show, 1905: Trials of Suction Gas-Producers, 208—Report on, 353—Trials of Swathe Turners, 376—Premiums awarded at, 377—Judges, 413—Accounts, 418—Proceedings in regard to, 423, 424, 426, 427, 429, 431—General Meeting of Members, 438—Reports to General Meetings, 436, 441.
Grain, Prices of, for 1905, 342.

Hendrick, James: A New Nitrogenous Manure, Lime Nitrogen or Calcium Cyanamide, 75—Analyses for Members during 1905, 77—The Composition of Turnips and Swedes, 281.
Highland and Agricultural Society: Proceedings at Board and General Meetings, 423—Constitution, Appendix, 3 —Privileges of Members, Appendix, 4 — Establishment, Appendix, 5 — Meetings, Appendix, 10.
Horned Cattle, Aberdeenshire, by Jas. Barclay, 193.

Implements, Changes in Farm, since 1890, by John Speir, 46.
Injurious Insects, On some, in 1905, by Dr R. Stewart MacDougall, 224.
Insects, On some Injurious, in 1905, by Dr R. Stewart MacDougall, 224.

Jones, C. Bryner, and Douglas A. Gilchrist: Dairy Investigations in the North-East of England, 63.

Kilmarnock Dairy School, Grant to, 435.

Lighting of Farm-carts, Proceedings in regard to, 421, 426, 430.

MacAndrew, D., & Co., Aberdeen, appointed Showyard Contractors, 432.
MacDougall, Dr R. Stewart: On some Injurious Insects in 1905, 224.
MacNeilage, Archd.: Farming Methods in Ayrshire, 1.
Manure, A New Nitrogenous: Lime Nitrogen or Calcium Cyanamide, by James Hendrick, 75.
Manures, Nitrogenous, for Turnips, by R. Patrick Wright, 93.
Meadows, Timothy, by John Drysdale, 17.
Members admitted in 1905-1906, Appendix, 85.
Members, Analyses for, during 1905, by James Hendrick, 77.
Menzies, Mr Fletcher Norton, Resolution on his death, 426.
Meteorology of 1905, by Dr Alex. Buchan, 319.
Milk Investigations at Garforth, 1905, by Charles Crowther, 110.
Milk Records, Third Season, by John Speir, 237—Proceedings in regard to, 424, 434.
Motor Cars, Proceedings in regard to, 433, 435.

Nitrogenous Manure, A New: Lime Nitrogen or Calcium Cyanamide, by James Hendrick, 75.
Nitrogenous Manures for Turnips, by R. Patrick Wright, 93.
Nomination of Directors, Meetings for, Appendix, 11.

Oats, Prices of, for 1905, 345.
Office-Bearers, Appendix, 5.
On some Injurious Insects in 1905, by Dr R. Stewart MacDougall, 224.
Orkney, Agricultural Co-operation in, 425—Grant in aid of, 428.
Over-Dressing of Barley, Proceedings in regard to, 428, 432.

Pastures, Top-Dressing: Slag, Kainit, and Lime, by R. Shirra Gibb, 80.
Peebles Show, 1906, Proceedings in regard to, 421, 425, 426, 429, 431, 433, 434, 436, 441—Premiums offered, Appendix, 57.
Pharmacy Bill, Proceedings in regard to, 428.
Ploughing Competitions in 1904-1905, Medals awarded, 414—Regulations for, Appendix, 53.
Potato Crop, The, by David Young, 143.
Premiums awarded in 1905, 377—Offered in 1906, Appendix, 41.
Prices of Grain for 1905, 342.
Prices of Sheep, 349.
Prices of Wool, 351.
Proceedings at Meetings, 423.
Publications, Proceedings in regard to, 426, 442.

Records, Milk, Third Season, by John Speir, 237.
Royal (Dick) Veterinary College, Proceedings in regard to, 429.

Science Department, Reports to General Meetings, 437, 442.
Scott, R. Sinclair, Resolution on his death, 424.
Sheep, Prices of, 349.
Sheep Scab Order, Proceedings in regard to, 428, 429.
Shows, Circuit of, Proceedings in regard to, 427.
Showyard Contractor, 432.
Sinclair Scott Trophy, Proceedings in regard to, 434.
Speir, John: Changes in Farm Implements since 1890, 46—Milk Records, 237.
Statistics, Agricultural, 329.
Suction Gas-Producers, Trials of, 208.
Swathe Turners, Trial of, 376.
Swedes, The Composition of Turnips and, by James Hendrick, 281.

The Composition of Turnips and Swedes, by James Hendrick, 281.
The Potato Crop, by David Young, 143.
Timothy Meadows, by John Drysdale, 17.
Top-Dressing Pastures, Slag, Kainit, and Lime, by R. Shirra Gibb, 80.
Trial of Swathe Turners, 376.
Trials of Suction Gas-Producers, 208.
Turnips, Nitrogenous Manures for, by R. Patrick Wright, 93.
Turnips, The Composition of, and Swedes, by James Hendrick, 281.

Veterinary College, Royal (Dick), Proceedings in regard to, 429.
Veterinary Department: Medals awarded, 413; Appendix, 20.
Veterinary Education, Proceedings in regard to, 441.

Wheat, Prices for 1905, 342.
Wilson, David, D.Sc., appointed Chairman of the Board, 431.
Wool, Prices of, 351.
Wright, R. Patrick: Nitrogenous Manures for Turnips, 93.

Young, David: The Potato Crop, 143.

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Subscribed Capital . . . . £1,000,000.
(£930,000 UNCALLED.)

THIS **Association** (with Funds of over **Two Million Six Hundred and Ninety Thousand Pounds** in hand, securely Invested, in addition to the above Uncalled Capital) undertakes every legitimate form of **Life Assurance Business.**

The Advantages it offers comprise:—

Absolute Security. **Moderate Premiums.**
Equitable Participation in Profits.
Liberal and Simple Policy Conditions.

ORDINARY "WHOLE LIFE" AND "ENDOWMENT" ASSURANCES
With Compound Bonus every Five Years.

DEFERRED ASSURANCES FOR CHILDREN,
An Attractive Scheme at very Low Premiums.

PERFECTED COMBINED INVESTMENT AND INSURANCE POLICIES.
Policies World-Wide and Indisputable.
Claims paid immediately on Proof of Death and Title.

NEW AND INCREASED RATES FOR ANNUITIES.

LOANS Arranged, in connection with LIFE ASSURANCE, on LIFE INTERESTS, REVERSIONS, PERSONAL and other approved SECURITIES.

CHIEF OFFICES:
EDINBURGH: 41 Charlotte Square. LONDON: 12 Waterloo Place.

GLASGOW BRANCH: 105 WEST GEORGE STREET.
ANDREW PENN, Secretary.
Agencies in all the principal towns in Scotland.